PACIFIC DISCOVERY

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PRE-DISCOVERY

"WHAT AN IMMENSE GEOGRAPHY has been revealed! What infinite hives of population and laboratories of industry have been electrified and set in motion! The great sea has rolled away its sombre veil. Asia is found and has become our neighbor. . . . North America is known to our own people. Its concave form and homogeneous structure are revealed. Our continental mission is set to its perennial frame. . . ." Wallace Stegner reports thus a Fourth of July speech in 1868, in the capital of Colorado Territory, by the veteran frontiersman William Gilpin *(Beyond the Hundredth Meridian,* Houghton Mifflin, 1954). What an immense geography, indeed, confronts *Pacific Discovery!* At the edge of the concave bowl we are perched between the immensity of North America and the vastness of the great sea that rolls away to our neighbor Asia. Limited by our perennial frame of 32 pages six times a year we have a mission to describe to a growing hive of population (the percentage that is interested in such matters, anyhow) the form of nature, the structure of human history, and the findings from out scientific laboratories, as revealed within our tremendous geographical bounds. Friends often ask how we manage to fill issue after issue with such a variety of subjects. The problem is, running over! Variety of subject entails brevity of treatment. "The obligation to be brief may, it is true, have great advantages," Agnes Arber says in her study of a biologist's approach to his tasks *(The Mind and the Eye,* Cambridge University Press, 1954); "Coleridge, whose prose tended to diffuseness, often achieved concentrated expression in the marginal notes wherewith he decorated his own (and his friends') books, since here he had no choice but to submit to confinement of space." Taking our confining frame, of necessity, as a window to the world of nature and man and nothing more, we'd be remiss indeed if we did not point to the broader view revealed in books, which enable the reader to enlarge his favorite interests. Hence our efforts to relate our book columns, in part at least, to our articles. We firmly believe that a good book on a subject of interest is one of the best values today or any time. Oscar Lewis says of a great explorer-geographer and one of the truly great presidents of the California Academy of Sciences that "he early became an avid collector of books, particularly in fields related to his professional interests" *(George Davidson: pioneer west coast scientist,* University of California Press, 1954). We are glad to acknowledge the help of good books in our task of revealing small parts of "an immense geography."

DISCOVERING PD'S AUTHORS

SINCE he sent us his Tarahumara story, **Martin Litton** has become travel editor for *Sunset* magazine, moving up to Menlo Park from Los Angeles to join the Lane Publishing family. Two of the beautiful Dinosaur Monument photographs in our January-February issue, illustrating Harold Bradley's article, were his. . . . ¶ Just after reading proof on the "Poisonous Fishes" article (his title was "From Reef to Reefer"), **Don Ollis** took off again with Dr. Bruce Halstead, this time for the Marshalls and other islands. The search for the key to that deadly puzzle still goes on. . . . ¶ Wishing to discuss some details of her "Copán" story with **Miss Dorothy Reynolds,** we found her one afternoon after she had dismissed her class in San Francisco's Balboa High School. Like many of our teachers, Miss Reynolds spends part of her summers visiting the places she teaches about – she has traveled widely in the Latin American countries, especially in the land of the Maya. And she has broadened her direct view through intensive study of the sources – books. D.G.K.

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THE COVER COPY

TARAHUMARAS at the crossroads: the store clothes, violin, and over-sized rosary of the Indian on the right indicate that he may be a shaman or medicine-man of the tribe. The cliff - dwelling independent beside him has never darkened a barber's or a clothier's door, refuses to be contaminated by civilization. The violinist, incidentally, is not blind, just invoking the Muse (or maybe he is squinting from the Chihuahua sun). Martin Litton's photo.

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EDITORIAL

Beneath the Blue Ceiling

> Ancient Ocean, it is not impossible that you hide in your breast treasures for the future. Already you have given Man the whale. But you do not easily allow the greedy eyes of natural science to probe the thousand secrets of your intimate anatomy: you are modest. . . . I salute you, Ancient Ocean.—LAUTREAMONT, quoted by Diolé in *The Undersea Adventure*.

IN THE TWILIGHT SUMMER of 1940 we walked entranced one day along the floor of Castle Harbour, Bermuda. The treasures in the breast of the subtropical Atlantic – a small sample, at least – spread fanwise from rock and sand or glinted in passing from many-colored scales, through the double lens of warm sea and helmet glass. Finding ourself in this unaccustomed situation called for some assurance of present safety and freedom from anxiety as to eventual return to the familiar world we trusted was still tied to the upper end of our air hose. It calmed us to recall that it was our wife and William Beebe who manned the pump in the launch somewhere overhead. This was baptism for both of us, but Dr. Beebe had pioneered the rather primitive helmet diving for marine biologists, though his fame was now firmly linked to the bathysphere which had given him 500 fathoms for five.

Castle Harbour was soon a roaring hell of bombers for Britain, no place for the peaceful sciences. Curiously, this war that sent the greatest underwater explorer back to his old love, the jungle, was secretly giving birth in France to a device and an almost fanatical group of pioneers destined to revolutionize the art of diving. The air-hose tether to the surface was being cut. An Occupation-beached naval officer, Jacques-Yves Cousteau, and a Parisian engineer, Emile Gagnan, were clandestinely inventing the "aqualung."

The world learned of it, after the war, through the film *Sunken Ships* that Cousteau, Tailliez, Dumas, and the rest had been inspired to make by the French fleet's "suicide" at Toulon. The film was both epitaph and birth announcement. Then came *The Silent World* – Captain Cousteau's book was launched here enthusiastically endorsed by Dr. Beebe and Rachel Carson.

The Silent World can now be placed in the context of a growing body of literature about the penetration of the world's last vast unknown, the sea, by means of free diving. The greatness of Cousteau's work and of his book is confirmed, not dimmed, by the accounts his fellow-divers of the Undersea Research Group, Tailliez and Diolé, published soon after. Rather, a most significant fact gains stress: that this tremendous turning point in the exploration of the planet had the great good fortune to be announced, not second-hand, but with the eloquence and conviction that could only come from the hearts and souls of the men who made the turning, who are pointing the new way. It is doubly fortunate that they are not merely clever mechanics or athletes, but highly literate scientists with philosophical insight plus a sense of the poetry visible in what they are doing. Their books claim a place beside Beebe's in the literature of discovery. They are heroes to a rising – or should we say a sinking – generation of explorers, having first presented it with a wider underwater world to explore and the wings to fly therein. These books are dangerous: they will turn many a youth seaward and make a diver of him – or her. The novice is likely to become a passionate devotee, at the level of his choice: skin-diving for sport, such as spearfishing, with or without the aqualung; or the serious pursuit of things undersea, with the device, where length of stay is a factor in fulfillment of purpose. It is the latter that is setting man on a new path, one that may lead him to grasp his beginnings.

Cousteau and Captain Philippe Tailliez founded the Group in 1945. *The Silent World* and Tailliez' *To Hidden Depths* complement each other, just as their authors have been inseparable companions in life and work. Vital to the team was Frédéric Dumas, civilian expert and "the world's most experienced diver," whose exploits run like a bright thread through both books. If you've read Cousteau, you will enjoy reliving many of the same adventures, picking up the same threads freshly woven by Tailliez – finding new ones, too, as when he dove for treasure in Indo-China.

" 'Why . . . go down into the sea?' is a riddle we are often asked by practical people," Cousteau says. "George Mallory was asked why he wanted to climb Mt. Everest, and his answer serves for us, too. 'Because it is there,' he said. We are obsessed with the incredible realm of oceanic life waiting to be known." "In the middle of the twentieth century the sea is still unknown," Philippe Diolé says. "Man's exploitation of (it) has only just begun." Of the earth's area, 196,940,400 square miles, 141,055,400 are water.* Five sevenths of the globe! Has man ever ignored the challenge of a great unknown? The oceans, of sailors, have long been charted. Sounding and dredging have mapped the gross topography and geology of the bottoms only in part, however. As to those parts that are of first economic and political interest to nations and men, the 8 million square miles of the continentental shelves – even they, "with their deep underwater valleys and rocky precipices, . . . are mysterious, unexplored landscapes" (Diolé). The continental shelf, indeed, is the chief present challenge to the undersea explorer. Naked divers with the aqualung have reached half way to the 600-foot depth of its edge and will go the rest of the way when nitrogen narcosis has been conquered by the right breathing mixture. Beyond that? The plunge off the edge to the ocean bed, the horizontal exploration of the deeps, will take machines on the order of Piccard's *Bathyscaphe*, self-powered, self-

*Collier's World Atlas and Gazetteer, Rand McNally Edition, 1953. It should be noted that the figures on p. 7 of Diolé's *The Undersea Adventure* (American ed.) appear to have been typographically butchered.

sinking and -rising, free of "wires" to the ceiling. The *Bathyscaphe's* 1948 trials off the Cape Verdes are graphically described by Cousteau and Tailliez – they both took part. Tailliez (his book is newer) describes the successful 1953 tests of it as redesigned by the Group. When the will to do has possessed him, man has always achieved the means.

The doings of this new breed of "menfish" are being read with absorbed interest at all ages. Naturally it is the young who are most likely to be moved to go forth and do likewise. A recent *Life* tells of spearfishing in Florida – a new sport to us, it has been a way of life for countless generations in the South China Sea, and among Pacific islands; wherever the sea is warm and clear men go into it for food as far as lungpower can carry them, it may be 10 or 12 fathoms.

Here is a new world for young scientists to conquer, nor does one need to be a muscular *male:* witness Eugenie Clark, Ph.D., ichthyologist, who dreamed at nine of spearfishing in the Red Sea and was there doing it, not so many years later, to get specimens for scientific research. Dr. Clark tells her story, from nose-against-glass in the old Aquarium at New York's Battery Park to fish-nose-against-face mask in the Red Sea, very delightfully in *Lady With a Spear.* Give this book to any high school student or college freshman zoölogy bent, and we'll say it's 50-50 he – or she – plumps for sea life and starts saving up for mask, fins, and spear or camera. It is perhaps the best book to read after Don Ollis' article in this issue because a good part of it relates Eugenie Clark's own undersea adventures seeking poisonous fishes around the Pacific islands from the Palaus to Saipan.

The Red Sea appears to be a favorite spot for marine biologists as well as sport fishermen. An adventure-loving young scientist is Hans Hass, whose *Manta* takes us to the Red Sea to visit brilliant coral reefs, weed-draped and fish-haunted wrecks, and to meet face to face various sharks, an engaging Englishman representing Empire at Port Sudan, and native fishermen who are characters. *Manta* is another book to start young blood racing seaward. It shows, too, what one man can do with little help or means, except what it takes to get there! A fine photographer, Hass pioneered Red Sea diving for science. Since then, he and his lovely bride have made an expedition to Australia's Great Barrier reef, and have acquired a schooner.

If Cousteau and Tailliez are the Wright brothers of free diving, and Hass a sort of Lindbergh lone eagle in the Red Sea, then Philippe Diolé may be – and has been called – the Saint-Exupéry of undersea flight. The veteran Tailliez introduced him to the aqualung and all its marvels of underwater freedom for men. Diolé went into the sea an enthusiast and a seeker; he emerged a philosopher and poet, to declare: "Submarine poetry . . . is a favor that the sea accords right away to a diver of sensibility. He needs only a minimum of gifts: a certain skill in the water, a quality of awe, curiosity. A submarine sensibility will one day become one of the attributes of the cultivated man, like taste or an ear for music." *The Undersea Adventure* has a poet's striving for exact expression of that which is scarcely approachable in familiar terms:

Between the air and the water, a steel blade quivers. What people call the surface is also a ceiling: a mirror from above, watered silk from beneath. . . . That dazzling screen is the border between two worlds, as clear to one as to the other. . . . A mysterious continent traces itself below me. I swim between the pages of an illuminated manuscript. Now I am dazzled by the purity of the light, the luminous beauty of the deep. A crystalline quality of light gives everything the purity of glass. The opened pages end in a maze of rocks, beyond which a flow of blue water narrows out of sight and then widens. Over them is stretched a thick sky on which I glide until I reach shapes that turn into submarine peaks, or cathedrals rising from the plains on summer mornings.

Diolé is a naturalist, too, as many chapters of the book reveal in telling the ways of animals, the nature and uses of seaweeds. Accepting as he does the advent of a new undersea age, he becomes a new kind of sea lawyer in his chapter on political and legal implications of widespread exploration and appropriation of the continental shelf and its resources, including archeological remains. Marine archeology, in fact, is undoubtedly Diolé's chief obsession, upon which he discourses learnedly and, for this reader, fascinatingly, in his newest book, *4,000 Years Under the Sea.* Here he reveals a touch of the mystic as he reaches for what "may be a golden key" to man's ultimate knowledge of himself: "I have seen opening before me long vistas of the deep, down which, always ahead of me, I seem to catch the shadowy shape of man. I am a late member of a long line of living creatures who may have had their distant origin in water." Biologists have long looked for life's beginnings in some ancient sea. Diolé wants to find a continuum as well, a fluid flow toward potentials. "The ghosts which I have started in the very heart of the waters, from the dark secrecy of wrecks, are eloquent to me not so much of death as of continuity, not so much of drowned life as of a determination to continue the adventure of living."

We have always been of the sea. "What shall it profit a man that he shall find again the pathway of the deep? What shall it profit him to be a diver, unless it be that there, as elsewhere, he may seek the proper balance of his human state?" The uses of science are obvious. Much increase in our material resources is indicated. But perhaps we can believe with Diolé that it shall profit us most to look beneath the blue ceiling for something needed to complete the whole man.

D.G.K.

NOTE: For review data on books mentioned turn to p. 32.

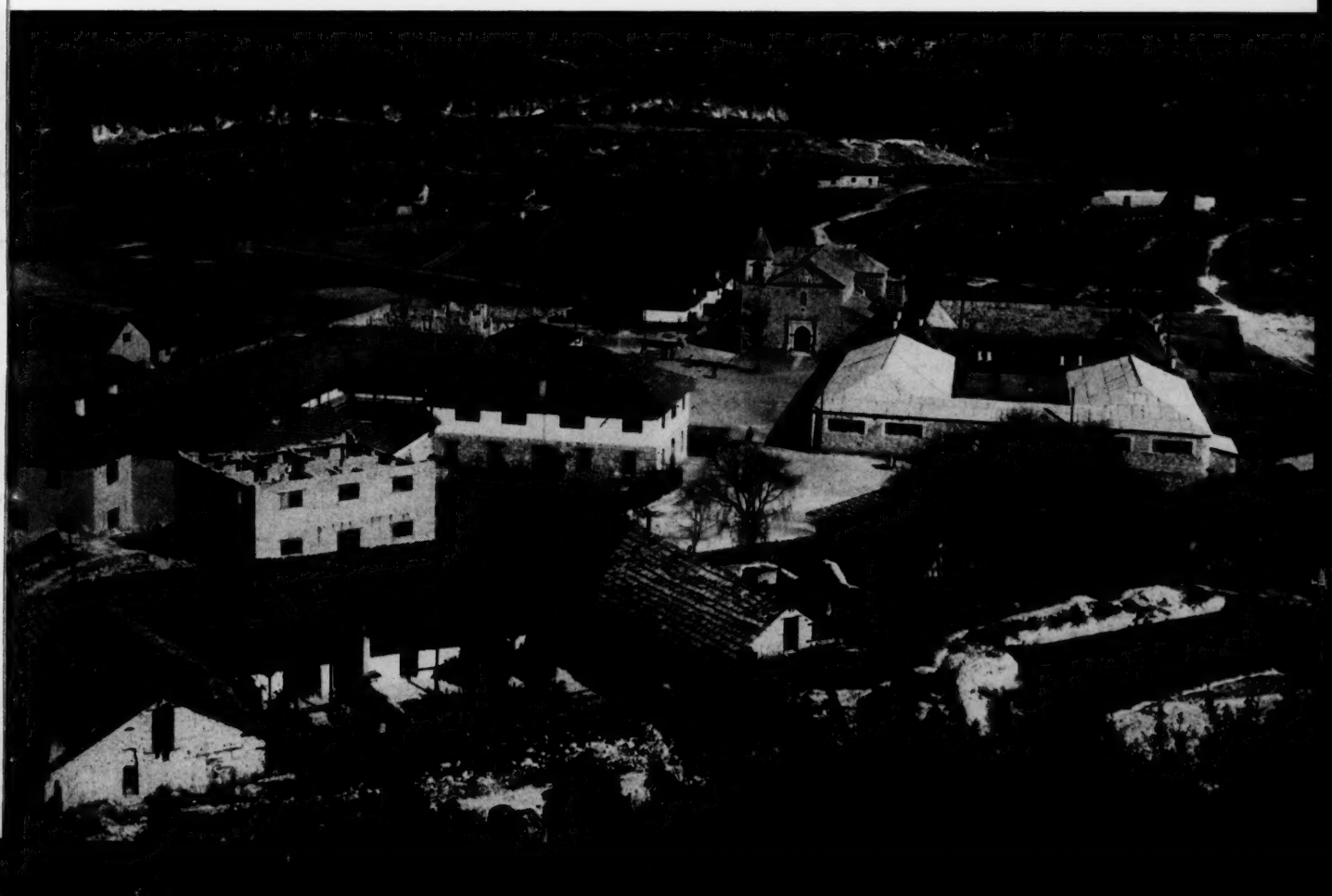
LAND OF THE L E

MARTIN LITTON

HALF AWAKENED by the cold, I fumbled for something to pull over my head. Frosty white moonlight stabbed down through holes in the pine-thicket canopy, but it was another light that froze me in that half-reclining position and sent a chill down my spine. A dancing pinpoint of yellow flame bobbed toward us through the forest, and I knew that at last we had found what we had come to see. We were well concealed; I shook Ray's shoulder and he raised his head to look.

The approaching torch, dripping with burning pitch, was a blazing pine-knot, held aloft by a nearly naked wraithlike figure which sped quietly, effortlessly, over the carpet of needles in a circle of light that sent magnified tree-shadows racing back into the darkness. For an instant we imagined that the eyes, set in a dark leathery face under a flowing black mane, peered into our bushy cove; but the figure raced on, the soft footsteps and

▲ The thin line of the KCM&O Railway links Tarahumaraland with the outside world. ▼ When you get into the heart of it, you find Sisoguichic Mission, founded by Jesuit padres about 1675, ministering to the largest un-Mexicanized element of Mexico's population.

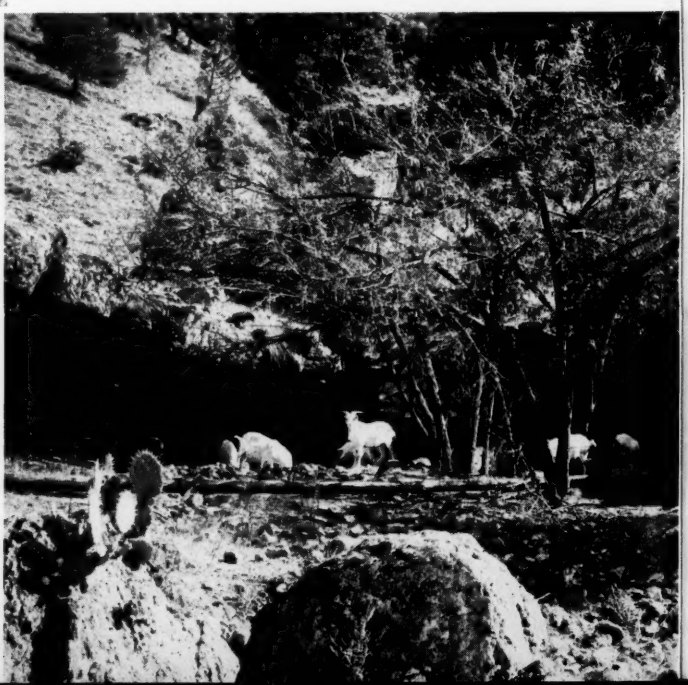


rhythmic breathing gave way to the resumed chirping of cicadas, and we were alone on the Sierra Madre again, three hundred airline miles south of the New Mexico border.

Alone, perhaps, but not unnoticed. In half an hour the drums began, and there was no more sleep that night. We listened to muffled messages – in softly echoing lullaby patterns as if the senders feared to disturb us – and to the muted distant answers. Three days west and south of the city of Chihuahua, over prairie and stream-bed and through the ever-rising forest in a stock Ford sedan, we had proved something or other by penetrating the Country of the Little People. How long their outposts had known of our approach we could not tell, but by morning our presence would be the subject of gossip in every cave and *galíki* from the upper Urique to the Batopilas.

Metcá, the moon, had disappeared. In the east, *Dilisópoli,* the morning star, heralded the dawn. Breakfast was well under way before we noticed the picture-book Tarahumara Indian across the meadow, hunched on a fallen trunk of *dokowáka* – and looking for all the world like nothing more than an inverted cone of black wool surmounted by a tall straw hat. We knew he was watching us. We beckoned several times before a pair of slim black legs unfolded from under the blanket and he darted toward us in short birdlike spurts.

He stood smiling shyly, so poised for flight that it seemed a handclap would surely send him up in a cloud of magic smoke. The blanket had slid off one shoulder, revealing his strong bare chest, the typical brief breechclout with triangular flap at the rear, the woven girdle with its ceremonial



↑ The Tarahumara: ". . . so poised for flight that it seemed a handclap would surely send him up in a cloud of magic smoke."

→ High up in the Barranca del Divisadero, a typical Tarahumara dwelling – cave, rough stone walls, goats, and the people unseen.

Photographs by the author

Five thousand feet from rim to river, the Barranca del Divisadero, splotched with tiny Tarahumara farms, is Mexico's deepest canyon.

design peculiar to the Tarahumara, and the heavy machete thrust between it and his body. We did know one word of greeting:

"Kwíra."

"Kwíra ganédi." The smile broadened, a hand reached out to touch ours briefly, and we were friends. This was the wild Tarahumara, that we had been told we would never see.

Not all of the 40,000 Tarahumara Indians of northern Mexico have clung so closely to their aboriginal culture as have those of the remote canyon-rent highlands between Creel and the Río Verde, but even so, it's a safe guess that the tribe as a whole comprises the biggest un-Mexicanized ethnological group in the country. Most of its loosely knit sub-clans are nominally Catholic, but they know little of the meaning of the faith, confusing it with their own deeply ingrained ancient religion. Jesuit missionaries, scattered thin, have been at work civilizing the Tarahumara for 400 years, yet pure paganism can still be found. Unlike their Yaqui and Seri neighbors to the west, these children of nature have offered little organized resistance to the white man; their formidable mountain habitat has preserved them against civilization's influences, good and bad.

True, the degree of isolation varies. Near mining centers like Urique and La Bufa, and commercial villages like Creel and Bocoyna, the Indians are considerably Mexicanized. Down the Sierra Madre's western slope toward Ocampo and Chinipas and along the lower Río Urique, they speak some Spanish and wear articles of Mexican clothing along with their tribal garments. These breaks with tradition are in sharp contrast to life on the upper reaches of the Urique and the Batopilas,

In an old Tarahumara cave, Christian figures are found among unfathomable petroglyphs.

where the atlatl and the bow and arrow are still in use, and rude cliff-dwellings are thought to prove the Tarahumaras' direct descendance from the prehistoric *Anasazi* of our Southwest.

In western Chihuahua, on some 25,000 square miles of the Sierra Madre crest and down into the great *barrancas* that are sliced sharply into the rolling upland, the isolated Tarahumaras reign supreme, in numbers if not in authority. Mexican laws affect their everyday life but little; scant attention is paid by government officials to purely internal Tarahumara affairs; only the most grievous offenses against Mexicans or other foreigners call for intervention from the "outside."

By our standards, the Tarahumara's way of living is full of paradox. He speaks no Spanish, yet invariably has a Spanish name. He builds a better house for his corn than for himself, for after all his grain-bin must be ratproof. His wealth is measured in cattle, which he neither milks nor slaughters. He considers mules and burros a hindrance rather than a help, for he can carry a heavy load farther and faster than they can, and over rougher ground. Years pass in which he sees no priest, yet he travels miles to a Christian church on Sunday to hear a Tarahumara sermon by a Tarahumara *maestro*. He prefers to live apart, disdaining the white man's work, yet he considers it a solemn duty to pitch in and help his neighbor (in return for a gourd or two of *tesguino*, the potent corn beer that is the most important socializing influence in his life). He has no reason to hurry, yet he runs almost everywhere he goes.

We found that offering gifts of food could cause embarrassment, as the Tarahumara, generous to a fault, invariably returns the courtesy – and expects the present to be eaten. The staple *pinole*– corn flour ground on a stone *metate* and mixed with water to a thin gruel for drinking – is not hard to take, and there are probably worse drinks than *tesguino;* but grasshoppers, worms, and body lice, and stews of rats, mice, and lizards, though doubtless rich in nourishment, are somewhat less than appetizing to the uninitiated. Apricots and oranges, first introduced by the padres, are mostly sold to the Mexicans, but the Tarahumara still has plenty of native fruits like the prickly-pear *tuna* (*napóko*) and the strawberry - shaped madrone. Roots and bulbs and tree leaves contribute to the diversified diet, which includes dead animals and birds in various stages of putrefaction (except dogs and coyotes, which are not eaten because of their human traits). Indians willing to dare the wrath of the water-demons who live in the whirlpools sometimes fish in the rivers with nets or spears.

Because they believe in reincarnation, Tarahumaras do not relish the killing of animals. The

↑ Modern cliff dwellers, the Tarahumara Indians build their stone houses in caves. They are believed to be the direct descendants of prehistoric cave-dwelling aborigines.
← Some of the dwellings of these supposed ancestors still cling in ruins to the cliffs of the Barranca del Cobre, strongly resembling the modern sites.

At Randall Groening's school, "civilized" Tarahumara girls pose nervously for an unaccustomed portrait.

word for "bear," *otcí,* is the same as for "grandfather"; bears are not molested. Cattle, prized and well-treated, are kept to draw the oaken plows and to fertilize the fields; without manure the rocky ground of the Sierra would be useless for agriculture. Cattle are kept in closed corrals to facilitate the collection of manure, and sheep and goats are locked up in the family cave at night so that none of the precious dung can be lost. After the "floor" has been built up to the height of a foot or more by the accumulation of excrement, the material is dug out and carried to the cornfields.

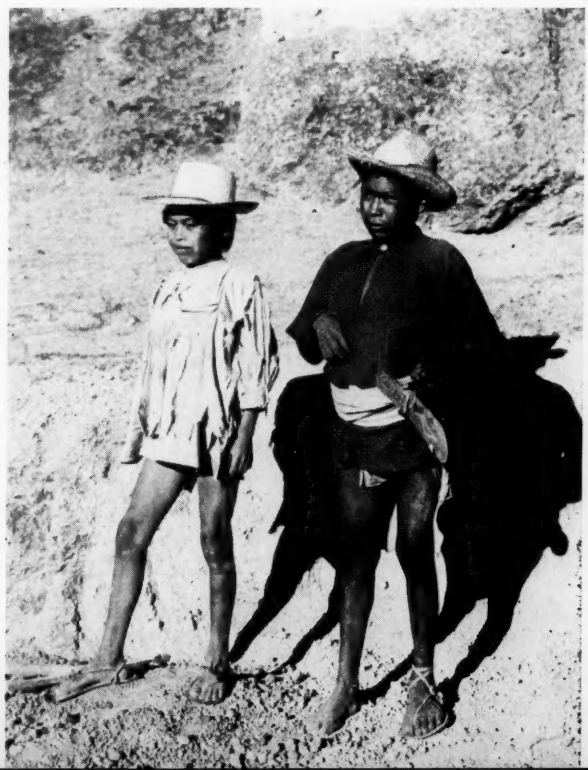
Because certain animals are notorious cornthieves, the Tarahumara rationalizes that they cannot be the dear departed reborn, so he sees no reason to spare them. He hunts down mercilessly – and adds to his larder – *Tcitcimóko* the chipmunk, *Tcipawíki* the ground squirrel, *Batú* the raccoon, *Tculéke* the badger, and *Pasótci* the skunk. This practice is not entirely compatible with the custom of placing a bowl of food near the bier of a dead relation and examining the surrounding ground the next morning for tracks that reveal what kind of animal form the loved one's soul has assumed.

Like every other ceremonial occasion, a funeral calls for businesslike drinking with the perfectly serious object of getting as drunk as possible.

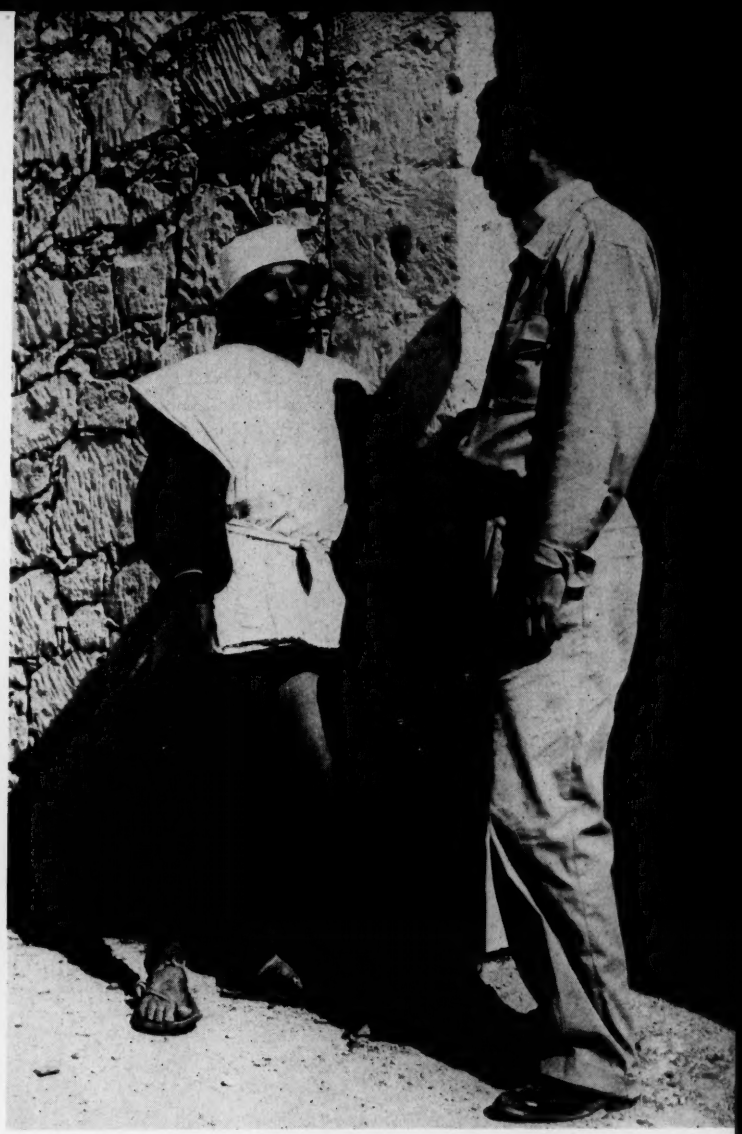
The *matachine* fiesta, most joyous and colorful of Tarahumara ceremonies, is basically a Christian rite, sometimes attended by Jesuits. The participants go through an intricate routine, performing studiously though apparently unaware of the historic significance of their pageantry. A large picture of the Virgin of Guadalupe, gilt-framed, is featured in these celebrations. Sorcery is banned; the witch-doctor's semi-occult skills have no place in the affairs.

More seriously regarded is the indigenous *dutubúri* fiesta, a drawn-out, exhausting, powerfully solemn series of masked dances, ending in the inevitable properly alcoholic stupor. The *dutubúri* is the Tarahumaras' strongest invocation to God. At the beginning an ox, or sometimes a goat or sheep, is sacrificed by cutting its jugular vein. As the animal slowly dies, its gushing blood is scooped up in wooden vessels. Some of the blood is tossed, with appropriately worshipful gestures, to *Mápu Davénali Matciná,* the east, to *Mitcúatci,* the north, to *Mohinóla,* the south, and to *Túbao,* the west. The rest is baked dry and eaten. The celebrants feast also on the innards and flesh of the sacrifice; this is the rare occasion when fresh beef is to be had. At the same time, this offering to God serves as crop insurance, guaranteeing abundant rainfall.

The missionary-doctor is gradually replacing the shaman or medicine man of the Tarahumara. This latter worthy rises from long apprenticeship to practice a variety of cures, the highest and most difficult of which is maggot-sucking. Placing a hollow reed or crucifix against the afflicted part, the shaman sucks diligently and then shakes three or four squirming maggots out of the instrument, instantly relieving the patient's pain.



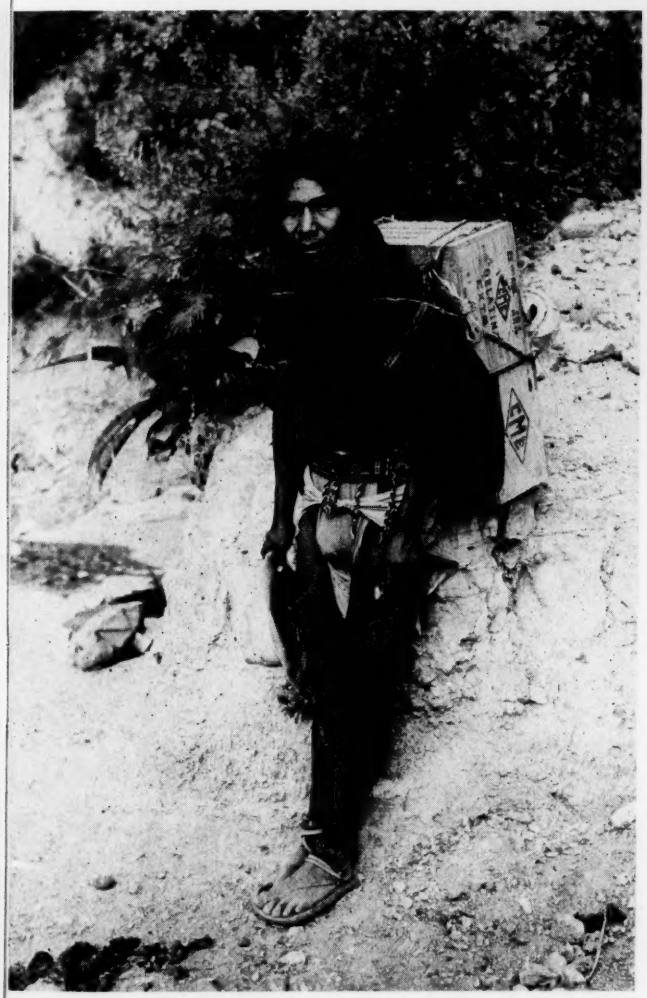
We found these Tarahumara boys working on the road near Creel.



A Tarahumara runner reports to Padre Gallegos at Sisoguichic Mission.

However impotent the shaman's treatments may seem to us, none of them is so unattractive as the good old Tarahumara household practice of applying human feces to the gums as a sure-fire remedy for toothache. Some of the home cures, such as the herbal cathartics and the sweat baths in a closed tent full of hot cedar smoke, make much more sense. And the cure for snake-bite is the last word in logic: you simply bite the snake.

Notwithstanding all his primitive practices and his utter ignorance of sanitation and modern therapeutics, the Tarahumara exhibits amazing health and stamina. When he runs a foot-race (a diversion second only to debauchery in popularity), he is as likely as not to continue on for three or four hundred miles; indeed a Tarahumara represented Mexico in the Olympic Games at Helsinki, and the story that goes around in the Mexican hill villages is that he failed to come home with first prize only because no one present knew the Tarahumara word for "stop."

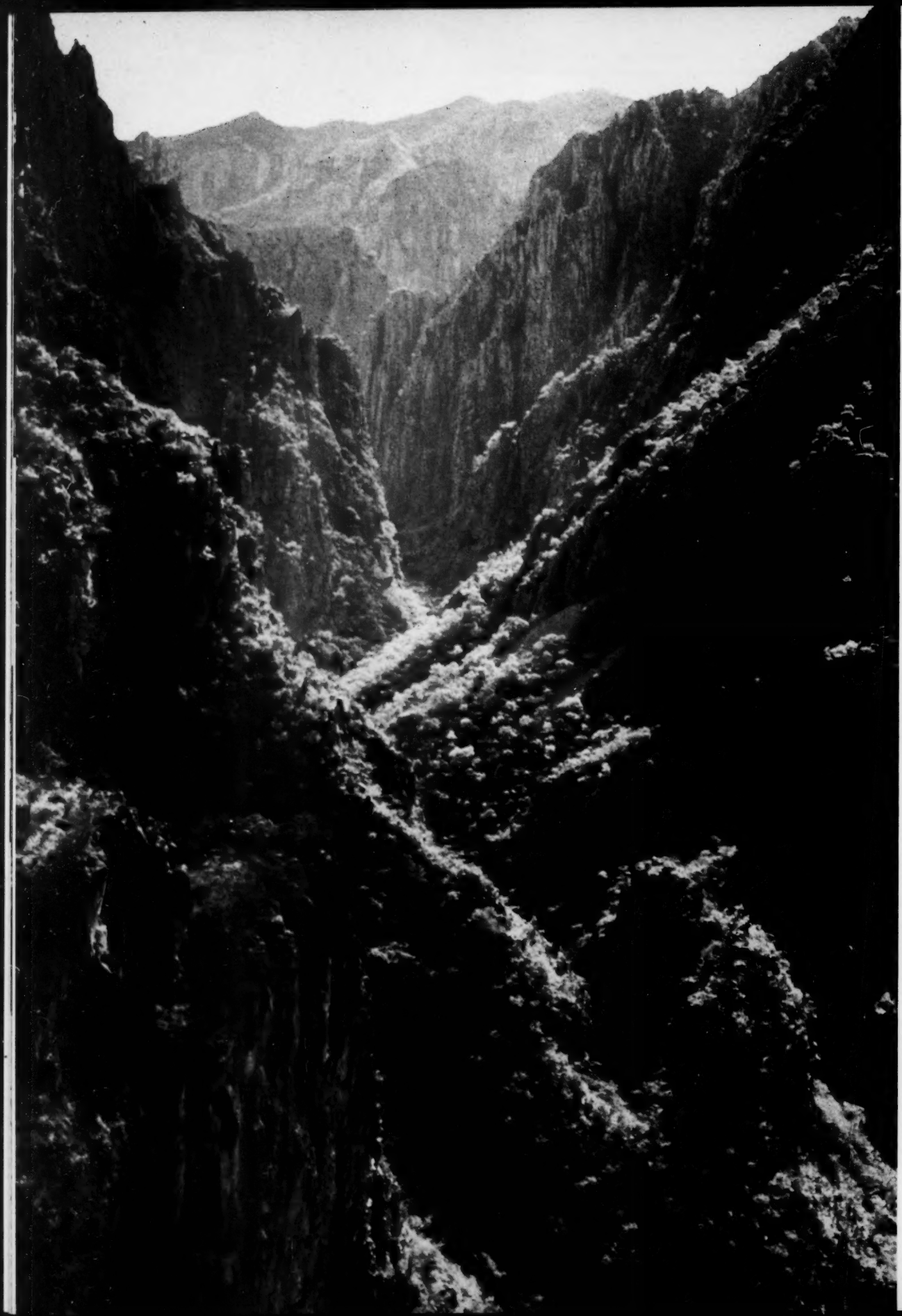


Carrying two boxes of dynamite down to a tiny mine deep in the Barranca del Cobre, a Tarahumara pauses by the trail to stare at the strange white men.

When a Tarahumara hunts a deer, he simply runs it to ground. With no weapon, he chases his quarry until it drops from exhaustion, sometimes with its hoofs worn down by the flight over sharp volcanic rocks. The hunter kills smaller game and birds by throwing stones; he seldom misses.

He is the best of ax-men, felling trees and splitting them into boards as serviceable as if from a sawmill. His skill with wood extends to smaller, more intricate things, too, like the thief-proof locks and keys he makes for his corn-house.

If the Tarahumara has a trade-mark, it is his



Just up-river from the mile-deep Barranca del Divisadero is the famed Barranca del Cobre, the wild and rugged Canyon of Copper of the Río Urique.

expertly fashioned violin. With only a log of ash or pine, an ax, a piece of broken glass, a tin can, some sheep-gut or piano wire, and a bit of the lily-bulb juice which he calls *iki* and uses for glue, he turns out an instrument that looks and performs like the commercial article. The designs for this and the guitar he borrowed from the white man; the flute and drum are his own. He not only makes the violin; he plays it creditably, with a wood-and-horsehair bow.

In contrast to the near-nakedness of the men, the women are, if anything, overclothed – at least from the waist down. They wear several voluminous skirts, in the style of the Apaches. Unlike the men of the tribe, they will run from an outsider, supposedly because of a legendary belief that the white man's only purpose is to lasso them.

In each other's company, men and women alike are so shy and retiring that without the organized *tesguinadas* or drinking-bouts it is questionable whether the population level could be maintained. While the daily routine of the Tarahumara calls for little sociability, these parties, usually held in connection with a communal work-project, effectively drown all inhibitions.

There has been little mixture of the Tarahumara bloodlines with others in modern times; it may be said that the race is still pure-bred. Mexicans who live among these small, dark people do not find it surprising that the tribe shows no sign of mixture with Europeans. Their explanation is that no Spaniard could have been attracted to a Tarahumara woman in the presence of the beautiful Aztecs captured and carried along on the expeditions of Cortés and his successors. Today there must be even less tendency to interbreed.

In other ways, though, the Tarahumara is slowly but surely losing his identity. The cross, which became a symbol of salvation when the Tarahumaras discovered that displaying it to Spanish soldiers meant the difference between life and death, is gaining steadily over the old idols. Meagerly financed but steadfast in purpose, the persistent Jesuits and one or two independent Protestant missionaries are breaking down the old taboos, putting clothes on the Little People, teaching them new crafts and trades, and doctoring them in sparkling new hospitals where cures for snakebite include no un-Christian revenge on the snake. . . .

Yes, the stronghold is shrinking, but it is still there – high and serene, a-flow with racing cloud-shadows, its slender pines alive with wind-music – all backed up there against the dizzy brinks of the *barrancas*. There you'll find the Little Ones, ready to greet you with a bashful touch of the hand and a cryptic benediction:

Sopolíi iláka mapulí onorúgume nawalíka dála tibúka atípoka bá.

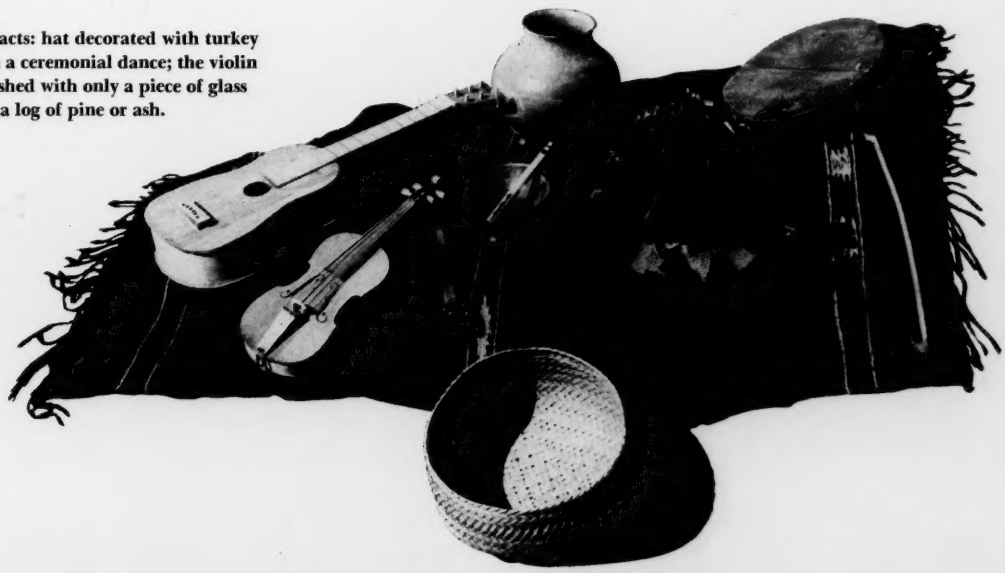
Further Tarahumara reading

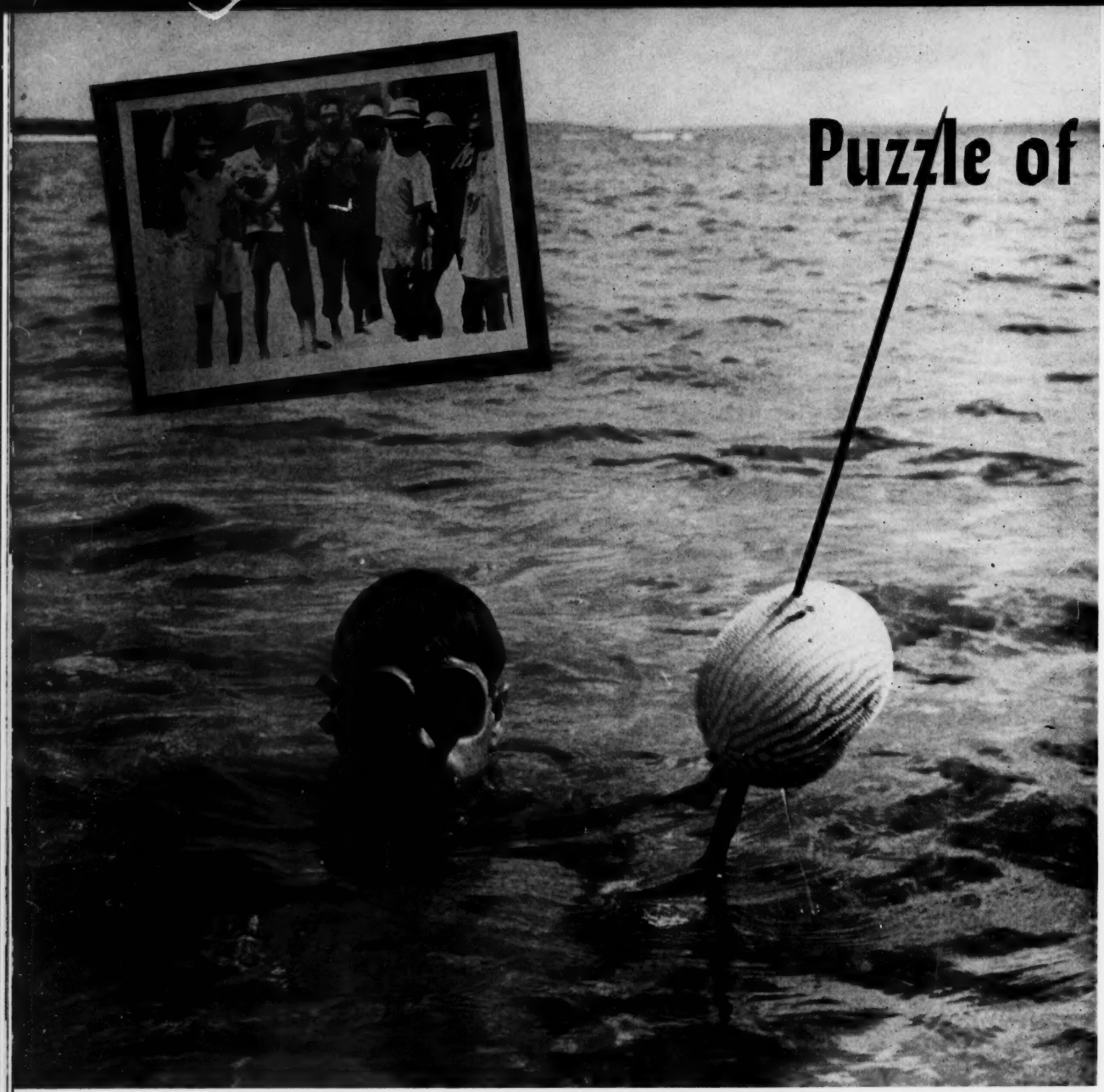
Early Jesuit Missions in Tarahumara. By Peter Masten Dunne, S.J. University of California Press, Berkeley and Los Angeles. 1948. 276 pp., 2 photos, map. $3.75.

From the start of Father Juan Fonte's work among them in 1611 to the expulsion of the Jesuits in 1767, the story of early missions to the Tarahumara makes a vivid chapter in Mexico's early history, here told by a noted Jesuit historian, author of *Black Robes in Lower California.*

The Tarahumara: *An Indian Tribe of Northern Mexico.* By Wendell C. Bennett and Robert M. Zingg. University of Chicago Press, Chicago. 1935. The principal anthropological work on the Tarahumara, to which the author of this article is indebted.

Tarahumara artifacts: hat decorated with turkey feathers is worn in a ceremonial dance; the violin and guitar are finished with only a piece of glass and began as only a log of pine or ash.





Puzzle of the P

DON OLLIS

ON MAY, 1949, 57 Filipinos on Saipan sat down to a Sunday dinner of their favorite dish — eel steaks. To prepare the feast, the eel was cleaned and sliced. The steaks, together with the head, were flavored with black pepper, vinegar, and salt and cooked for 30 minutes. Each eel steak was enough for four men.

Eel is a prized delicacy in the Far East and tastes somewhat like suckling pig. But this exotic feast ended in one of the worst cases of ichthyosarcotoxism on record. The bizarre symptoms of the poison affected the guests almost immediately. At first it was just a scratchy sensation in the mouth and throat and a tingling around the lips and tongue. In 30 minutes some were unable to talk. Then a numbness and tingling spread to their hands and feet. Choking sensations, vomiting, abdominal pains and muscular paralysis soon

↑ Dr. Bruce Halstead surfaces at Saipan with a deadly "death" puffer fish on his spear. (Inset of part of Filipino eel party, U. S. Army photo, courtesy Brooke Army Hospital)
→ The ichthyologists cruise along the bottom armed with spears and arbolette guns. Ralph Ocampo *(right)* has just speared an immature red snapper.

he Poisonous Fishes

followed. By Wednesday morning 11 natives were in a coma and one was semi-conscious; 17 were hospitalized. Two natives died of ichthyosarcotoxism and one required a tracheotomy, i.e., had to have his throat slit open in order to get air.

"ALU! ALU!" rang in our ears. The native word was unfamiliar but there was no mistaking its note of warning.

We scrambled into the canoe and looked in the direction the Chamorro boy was pointing. A triangular fin was cutting the water.

Just then Norman Bunker rose to the surface of the lagoon. His green rubber goggles made him look like a startled bullfrog gasping for air.

"Six foot sand shark headed your way!" shouted Bruce Halstead. "Just splash and he'll take off."

"I'll try the arbolette gun on him." Bunker sank under and in the clear water we could see him waiting motionless beside a jutting coral head.

The fin slipped past our bow and we caught a glimpse of the sleek body and the hateful little pig eyes of the "alu." Suddenly the fish saw Bunker. The great tail flipped and the shark veered away for the canyon between the coral heads. Bunker shot the arbolette spear into the white belly of the retreating fish. The shark twisted against the coral, where the spear shaft caught fast. Again he thrashed, bending the shaft almost double and snapping off the steel point. Still bearing the spear head in his body, the shark sped for the deep water of the canyon. Attracted by his trail of blood, two more dark shapes closed in after him.

Bunker retrieved the broken spear and swam back to the canoe.

"We aren't interested in collecting sharks, you know," said Halstead with mock severity.

These intrepid ichthyologists were from the school of Tropical and Preventive Medicine, College of Medical Evangelists, at Loma Linda, California. Dr. Bruce W. Halstead, medical ichthyologist, headed our expedition.

He and his two assistants, Ralph Ocampo and Norman Bunker, were collecting tropical reef fish. My job was to photograph them immediately upon capture to record their exact coloration. Our catch was to be frozen and shipped back to the laboratories at Loma Linda for identification and testing. These tests were to help determine why some food fish suddenly become poisonous or as

PHOTOGRAPHS BY THE AUTHOR

The inflated puffer, or maki-maki, was photographed on a sand-filled tray on the deck of the boat.

s spear.
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te guns.
napper.

Transportation was scarce on Saipan. We arrived at the docks in an ancient jeep, part of Saipan's "baling wire fleet."

native fishing resources. An outbreak of this poisoning in their food fish can be an economic kiss of death to an island's fishing industry. Should even one toxic fish be discovered in a catch, the entire catch, sometimes worth thousands of dollars, must be discarded. Furthermore, customers are naturally wary of future shipments from the same area.

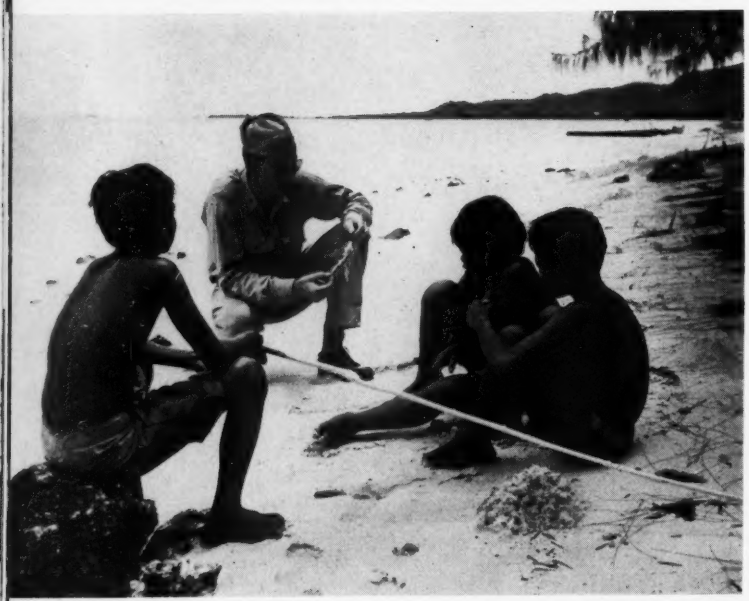
What makes a fish become poisonous? Why should a species be edible on one island, in fact, on one side of a reef – and poisonous on another?

At present, no one knows the answers to these questions. Moreover, there is little hope of discovering the solution until a solid background of data has been accumulated from painstaking field research all over the tropical Pacific.

In hopes of finding some clues to this puzzling poisonous fish problem, we had been invited by the High Commissioner of the Trust Territory of the Pacific to conduct research on the reef fishes of Saipan. The Office of Naval Research and the U. S. Public Health Service, had sponsored our research project.

We had arrived on Saipan only that morning. As we circled the airfield it was interesting to see how quickly nature conceals the scars inflicted by war in the tropics. Where the shores and hills had been blasted bare during the invasion, a lush growth of vegetation now grew down to the white beaches. Below us a white quonset hut, emblazoned with a "Welcome to Saipan," shimmered from the heat waves. As we landed the island looked tranquil, in fact almost deserted.

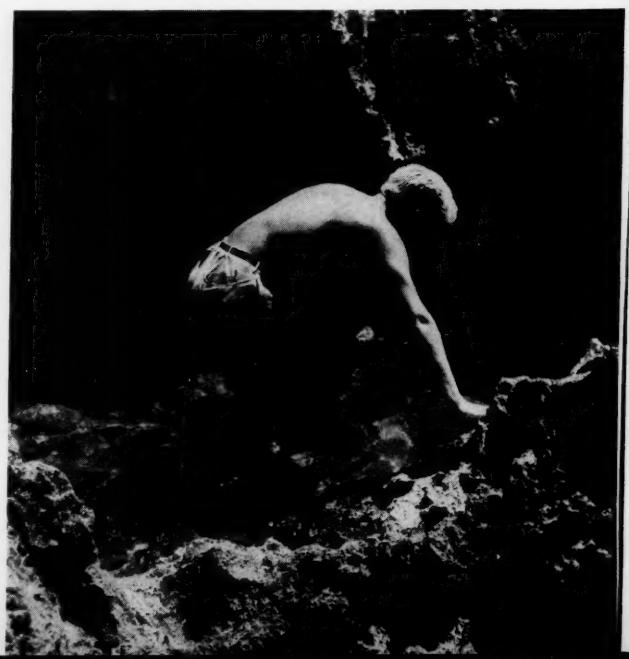
We hitched a ride on an ancient rattletrap jeep – one of the "baling wire fleet" on Saipan. We joked about it at the time, but it wasn't long be-



it is now called, *ichthyosarcotoxic,* in many areas of the tropical Pacific.

For nearly two centuries, bizarre reports of fish poisoning have been trickling in from the Pacific. One type of this poisoning is *tetraodon,* or *fugu* poisoning, caused by eating certain species of puffers. It is frequently reported in Japan where puffers are a national delicacy. Fugu poisoning usually causes death in about five hours.

Another less fatal form crops up in tropical species of sea bass, eels, black uluas, and red snappers. Most of the Central Pacific islanders are struggling for self-sufficiency by developing their



↑ The islanders can always supply much useful information to visiting scientists. Dr. Halstead is questioning some small boys about the lizard fish they have just caught at the beach.
→ Ocampo explores tide pools in rough lava cliffs of Saipan.

Halstead and Ocampo adjust an aqualung to be used for exploring deep water.

fore we were pleading and cajoling officials for the loan of "anything that runs."

When you consider the fact that the Trust Territory comprises 2,141 individual islands scattered over three million square miles of the Western Pacific, with the capital in Hawaii, you can see that transportation – land, sea and air – is the Administration's biggest headache.

From the airport we rattled north on a coral road for several miles through a low dense jungle. A bright new billboard welcomed us to the village of Chalan Kanoa, "Capital of the Northern Marianas."

Chalan Kanoa had been nearly demolished during the invasion and hastily rebuilt during the American occupation. The thousands of GIs were gone now, but they had left an indelible impression on the native culture.

Faded signs still faintly showed where "Jerry's Joint" and the "Stateside Restaurant" had flourished. The nostalgic melodies of dozens of juke boxes floated out into the street. Frequently we heard the native Chamorros singing hillbilly music with an authentic nasal twang.

Children, dogs, and chickens shared the street. Native men, dressed in bright "aloha" sport shirts and khaki pants worked over some antiquated jeeps. The women wore neat skirts and blouses or loose-fitting cotton housedresses.

Past the village we headed for the coast and our dollar-a-night reservations at the Saipan Hotel. Like most of the buildings on the island it turned out to be a series of quonset huts. It stood on the wreckage-littered beach at the very point where the Marines first hit Red Beach against the 30,000 well-intrenched Japanese.

We had no time to explore the ruins of Saipan's violent past. Ralph Ocampo bartered for the loan of a canoe while we stored our gear in hot lockers. These roomy wardrobes had a light bulb burning in a floor socket to keep mildew from peppering our clothing.

The water lay practically at our doorstep. A small native boy eagerly watched Ocampo load spears, collecting sacks, pans, and goggles into the canoe. In answer to his silent but wide-eyed appeal we loaded him in with the equipment. He more than proved his worth when he spied the shark.

After Bunker's "alu" got away, we continued to prowl the tepid underwater depths of the lagoon. Tropical fish swirled around us like the myriad colors and patterns of a changing kaleidoscope.

Bright yellow butterflyfish flitted past. Gaudily striped pomacentrids and angel fish, delight of modernist designers, eyed us curiously. Surgeonfish grazed like a herd of cows on the coral bottom. A sudden movement in a coral opening betrayed a moray eel waiting for prey, its vicious jaws agape. Irridescent green-spangled parrotfish, wearing a perpetual look of astonishment, darted away at the sight of us.

To prevent sunburning every time we surfaced, we found it more practical simply to leave our shirts and trousers on while "skin diving."

By early afternoon the pans were overflowing with fish. Ocampo, always eager for underwater action, spied another moray eel and went after it. The eel darted into a hole in the coral. It undulated gently, watching Ocampo with a vacant stare and jaws parted in a meaningful grimace.

An eel bite is a nasty experience. The teeth hinge inward and once its jaws close on an arm or leg, any attempt to pull away only locks the teeth erect. The eel can't let go, so its victim simply parts with a chunk of flesh.

Ocampo waited until I had both eel and skin diver in focus, then he jabbed with his spear

Thirty-five feet down, with aqualung and weighted belt to collect fishes at the bottom of a coral reef.

while I cranked away underwater with my Rolleiflex. The moray eel thrashed wildly, churning up the coral sand. Halstead swam into view and jabbed his spear into the eel. They lifted the wiggling, snapping fish to the surface, as I surfaced and photographed them above water as well.

We threw the dead eel into the canoe and headed for shore. Ocampo decided to swim back. As he reached shallow water he almost stepped on a sting ray. Its venomous spine was ready for just such an unsuspecting victim. The pancake-flat body blended perfectly with the coral sand. Only the outline of its whip-like tail betrayed its presence.

Ocampo jammed his spear into the head region. Shouting triumphantly and shoving the fish ahead of him, he brought it ashore.

"A dasyatid ray," he exulted, "and look at the size of him!" It was a giant. We guessed it to be 80 pounds as we dragged it up on the beach.

Ocampo could well appreciate the size of the monster. He had captured many off the coast of California (where a 30-pounder is a big ray) for a research paper he was doing on the venom apparatus of the ray.

Suddenly he bent close to examine the 6-inch spine. "The integumentary sheath is still intact!" he exclaimed.

It seemed inconceivable that a ray could grow to this size without ever having used its ferocious protective device. Yet there it was, a thin skin completely enclosing it. Ocampo could scarcely believe his good fortune. He was an expert on preparing histological sections of these spines. The very thought of preparing and examining microscope slides of a venom apparatus of this size — *with* the integumentary sheath intact, was beyond an ichthyologist's wildest dreams.

I asked him how often he found an adult ray with the sheath intact. "The mathematical probabilities are highly improbable," he said, beaming happily. It took two men to load it into a jeep.

Every day our catch had to be hauled two miles through the jungle to the "reefers." These are the GI equivalent of a walk-in type refrigerator. They had been built by the Marines during the occupation of Saipan.

Here the fish were frozen and packed in large redwood cases to await shipment back to the labs at Loma Linda.

By the second week we had a good representative selection of fishes from the lagoon. It was now time to collect fishes from the deeper waters on the other side of the reef. Many of the larger fish out here feed on the smaller and coral-feeding fish found in the lagoon. If the mysterious fish poisoning originated in certain corals, for instance, it might be transferred from the coral-feeders to their predators, the deep-sea food fish.

In hopes that we might discover such an ichthyosarcotoxic "chain-of-command," we headed for deep water in a borrowed motor launch.

What really tempted the Saipanese were the half-pound charges of TNT. We used these around coral heads in deep water. Bunker attached the caps and fuses while the boatman let the motor launch drift near a coral head. Bunker hurled the sputtering charge into the water. Ten seconds later a loud *whomp!* reverberated in a hissing spray. White foam and coral sand boiled up and in a few minutes fish floated to the surface. Immediately, Halstead, Bunker, and Ocampo dove in, collecting first the fish on the fringes of the explosion. These were often only stunned and could recover and escape quickly.

To the natives this was the answer to all fishing problems. They enthused over life on Saipan sustained by fishing with TNT. Actually, it is a very wasteful and destructive method for commercial fishing and it is generally forbidden. It was ideal for scientific collecting, however, since we wanted a representative sampling of all types of fish. The TNT brought to the surface many species that were impossible to spear. Moreover they were collected in perfect condition which helped later in identifying the species.

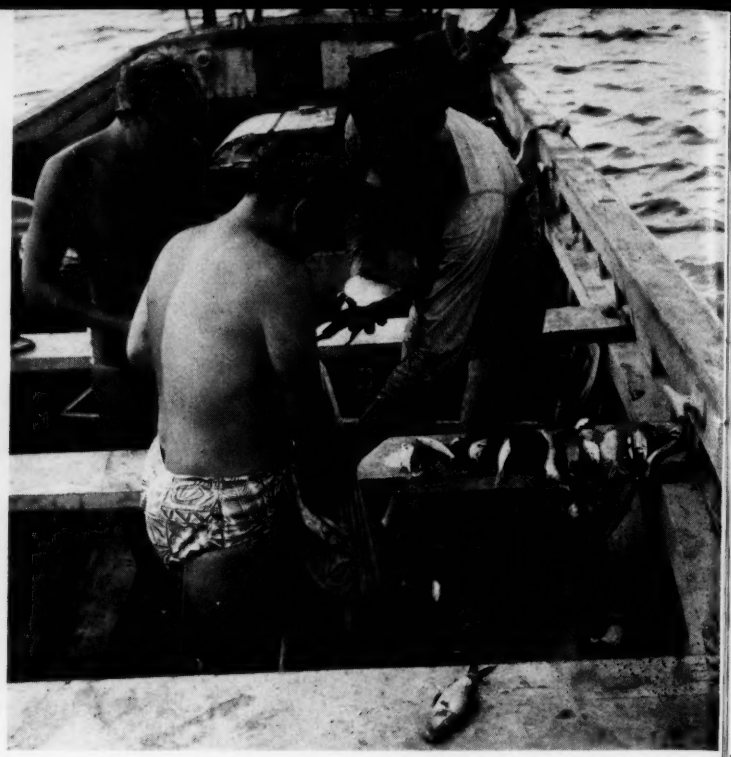
As fast as the fish were tossed into the launch I placed them on a tray filled with coral sand and photographed them in color.

It was amazing how quickly the true colors of the fish changed. In three minutes a lethrinid faded so rapidly and completely that it was scarcely recognizable as the specimen that had been captured a few minutes before. One of the surgeonfish, named for the lance-like spines on its tail, loses its purple spots as soon as it is killed. According to Dr. Halstead, "You can't get it out of the water before it has changed color."

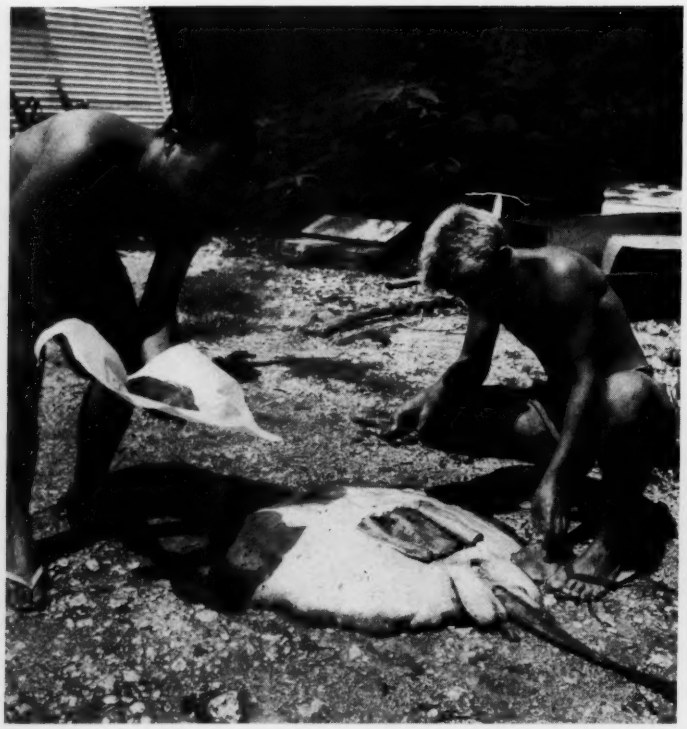
While the puffer doesn't change color so much upon capture, it does react with downright physi-

The native crewmen were intrigued with the methods the scientists used to collect fish. The ordinary native spear was a piece of steel rod, usually salvaged from a scrapped military vehicle, ground to needle-point sharpness. Armed with this a native could outspear us two to one. But the arbolette guns were a different matter. The glittering mechanics of this spear gun fascinated them. Whenever we laid one down a native was sure to offer to use it to "help us collect fish."

Ocampo got photographer Ollis with the underwater camera while Don was making a test run with the aqualung.



▼ *(Left)* Bunker and Ocampo remove the liver from a dasyatid ray, for freezing and shipping back to the laboratory at Loma Linda, California. *(Right)* Beauty dwells in the wreckage of war: Ocampo has just brought three handsome fishes up from beneath the rusting iron.



➔ The work of the three California scientists will make a difference in the lives of such islanders as these fishermen setting out in their motor-driven converted sampan, when the cause of deadly fish poisoning is at last discovered through laboratory research.

(Left) **Don Ollis had to shoot fish immediately after capture as their colors fade very rapidly.**
(Right) **Ocampo, Bunker, and Halstead put fish in collecting sack after TNT explosion.**

cal violence. At the slightest prick of a spear it demonstrates its outrage by blowing up like a balloon. Dr. Halstead brought several to the surface that were so distended they actually looked as if they were about to explode.

Ocampo brought in one ichthyological freak whose special adaptation was unique even among these strange-looking tropical fish. *Epibulus insidiator,* one of the wrasses, is noted for its distensible mouth. Ocampo cradled the garish black fish in his hands, pressed under its smallish jaw, and out shot a tube-like projection the size of a frankfurter!

"Fishing" with TNT gave us the largest and most representative catch of the trip.

Dr. Halstead and I were packing this load into the reefer when we heard a bull-like roar from Ocampo in the next locker. We rushed in to find him sitting on the floor holding his head in his hands. On the packing case beside him lay the frozen ray. The six-inch spine was gone. Someone had wrenched it out – possibly for a souvenir. Ocampo's dreams of histological slides of the venomous spine of the dasyatid ray were shattered.

"I'll probably never see another specimen like that," he moaned. "And with an intact integumentary sheath!"

Disappointment over the ruined specimen of the ray took the glow of accomplishment from our day's work. A cool refreshing breeze had ushered in the rain clouds. As we headed the decrepit military vehicle back to the hotel, we were caught in a rain squall.

After the rain we sat on our bunks, irritable and panting in the sticky sweltering mugginess that always follows.

The rainy season was now progressing rapidly.

The gentle "walking rains" increased to daily downpours. Between showers I was constantly adjusting my exposures to clouds and then sunlight. Underwater photography was worse, since the winds ruffled the surface and caused confusing patterns and materially reduced the light underwater.

One morning Halstead, Bunker, and I decided to explore the coast south of the Saipan Hotel.

The jungle along the shore thinned and then finally petered out into a scrubby brush that grew right down to the water's edge. Chalan Kanoa lay inland less than a mile, but there were only a few houses scattered along the barren coast. It was here that the 27th Infantry Division and the 4th Marine Division had "hit the beaches" of Saipan. Both American and Japanese wreckage from this grim battle had been bulldozed down to the shoreline. Tidewaters sucked in and out of the barnacle-encrusted, rusting debris. Brilliantly colored fish darted in and about its shelter.

Dr. Halstead decided that this would be an ideal area to collect fish by rotenone poisoning. Actually it isn't a poison. It suffocates the fish by contracting the capillaries in the gills.

We returned to the Saipan Hotel and waited for a calm afternoon. When we again approached this wreckage-ringed coastline, the water was oil-smooth. Cautiously Bunker scattered the dampened powder. We waited while it drifted along the shore and settled in the shallow water. A few minutes later Halstead and Ocampo followed, spearing up the dead fish that lay on the bottom. In a few hours we had the canoe loaded with fish typical of the tidal area.

With the rotenone-collected specimens packed in the reefers we now had a representative sampling of fish from Saipan.

Our final task was to see that the fish were properly frozen and packed for shipping home. The night before we left, the temperature control on the reefer was turned to its lowest degree. At noon the last day we loaded six huge crates of solidly frozen fish, our baggage, and fishing paraphernalia into a Coast Guard PBY. An hour later we landed on Guam. Here we stowed the six redwood crates in the dockside reefers to await freighter transit back to the States. Then we boarded a MATS airliner for the island-hopping flight back home and a brief respite from the poisonous fish problem — at least until the crates of fish caught up with us again at Loma Linda.

DOROTHY REYNOLDS

IN A GREEN upland valley of western Honduras lies the once-splendid Mayan city of Copán, abandoned for over a thousand years, yet still beautiful in her ruins, the strange, intricate artistry of her sculpture, the mysteriousness of her hieroglyphics, the majestic ugliness of the gods or leaders depicted on her monuments.

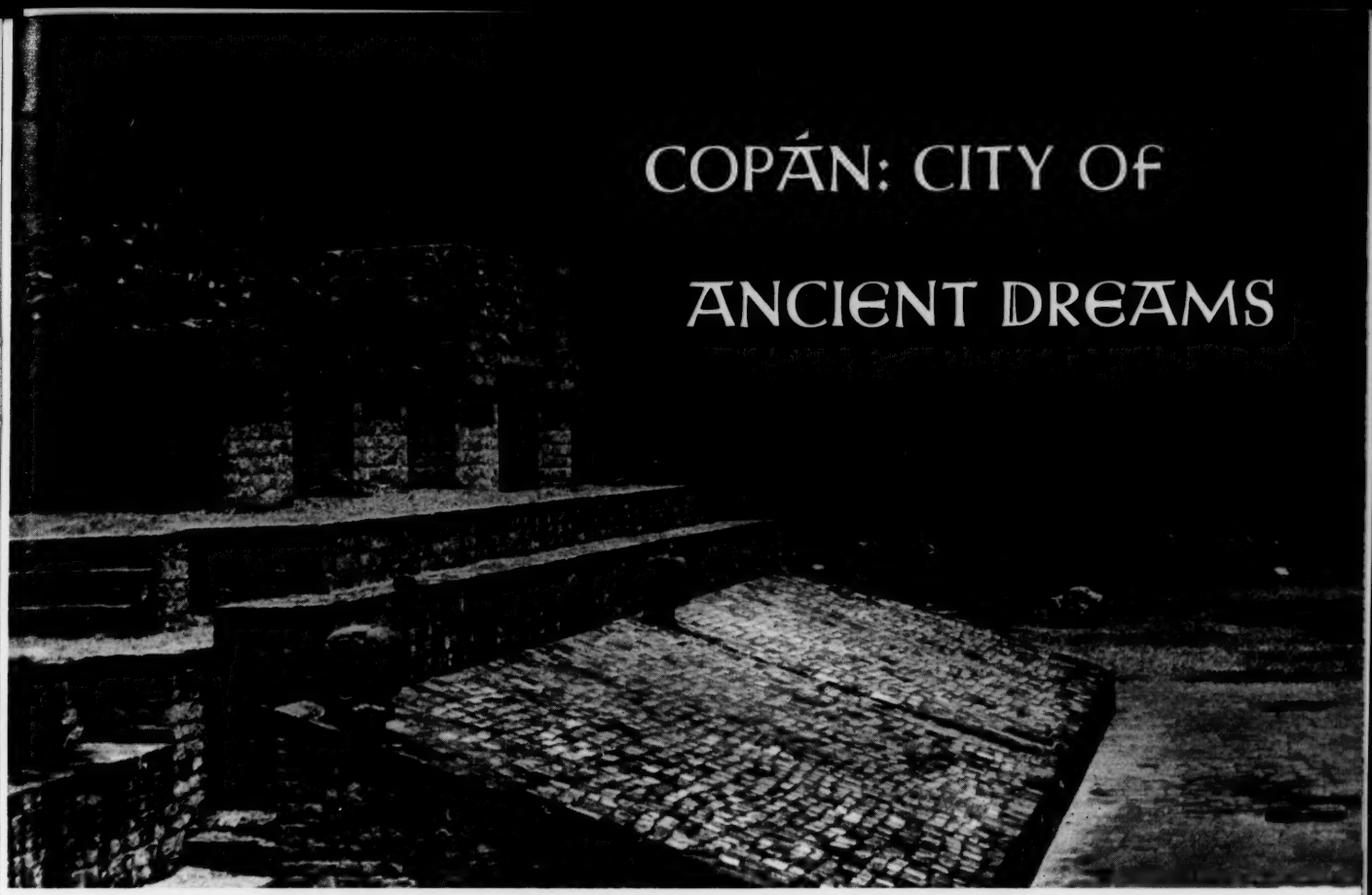
Situated 2,000 feet above sea level, Copán is surrounded by mountains teeming with deer, tapirs, jaguars, monkeys, and many varieties of brilliant tropical birds. Though well away from present-day centers of population, it is not really remote — as ruins go in the Yucatán region — for it can be reached by plane, by horseback, and (in the dry season) by jeeps and other sturdy cars.

This city was once the center of a complex civilization, which seems to have arisen about the middle of the fifth century A.D. Apparently, like other cities of that period of Mayan history designated as the Old Empire, she quickly reached her zenith of civilization, flourished for a time, then, early in the ninth century, was abandoned, her people migrating, it is supposed, to Yucatán and the highlands of Guatemala. For a long time afterwards her very memory was lost.

But although much was destroyed with the passage of the centuries, the ambitious plan upon which this metropolis was constructed is still plainly evident in the five great courtyards around which the ceremonial life of its people formerly revolved. Some of these were reached by splendid stairways; all of them were surrounded by great temples in which the gods were worshipped and by the palaces of proud nobles and powerful priests. Finest of these public squares is the Great Plaza, roughly 350 by 850 feet (with the two adjoining courts on the same level), in which rise most of the stelae that are still the main glory of the ruined city.

Mayan stelae are tall, upright monoliths, each carved from a rectangular block of stone, which were set up at intervals of twenty, ten, or occasionally five years, depending on the opulence of the particular city commemorating the successive time periods of the Mayan calendar — for such was their chief purpose.

On the front, there is usually the figure of a god, ruler, or high priest bearing curious insignia and fantastically clothed, with towering plumed head-



COPÁN: CITY OF ANCIENT DREAMS

dress and quantities of ornate jewelry. On the sides and back, hieroglyphic inscriptions and symbolic motifs are carved deep in the stone. In front of each such monument is a flat stone, just as richly decorated, which presumably served as an altar.

What kind of people inhabited the environs of this once-splendid center of religion, learning, and art? The carving is plainly the product of a sophisticated race, possessing an exuberant imagination, expressed in a rich and highly stylized symbolism that reaches its most fantastic development in such weird monsters as those of the double-headed serpent altar and the jaguar stairway. Human figures are highly conventionalized and there is a wealth of ornamentation conceived and executed with the usual Mayan flamboyance, which in many ways resembles elaborate Spanish baroque. One thing the artists seem never to have realized was the value of blank space – every inch is elaborately carved.

Important people of Copán – priests and chieftains – probably lived in the so-called "palaces" near the temple structures. They dressed in barbaric splendor, the men wearing wide sashes profusely patterned with embroidery or feather work arranged so that the ends fell like aprons in front and behind. Over their shoulders they threw cloaks of brocade or sometimes of irridescent green quetzal feathers. Their ornate headdresses with plumes falling behind in shimmering cascades towered to such a height that the weight must have been a considerable burden to the wearer. Luxurious high-backed sandals completed the costume, which was further embellished by great earrings, pectoral adornments, bracelets, and anklets of jade, obsidian, and other precious materials.

The women were equally splendid, if we are to judge by the one female figure represented at Copán, adding to the other adornments elaborately patterned hand-woven skirts much like those still used by many Guatemalan Indians today.

Before the erection of the first stone stela there must have been a period when sculpture was done in wood, which eventually decayed, leaving no trace (the explorer Stephens in 1842 found carved wood lintels in the ruins of Uxmal in northern

An architectural feature common to the principal ancient Mayan cities is the ball court. Here a ceremonial game was played with a rubber ball, which seems to have had characteristics of basketball, handball, and soccer, as well as some entirely its own. The parrot heads evidently served as goals or markers. Some courts have large stone rings.

Yucatán, which had somehow escaped rot and termites). Doubtless the highly complicated chronological system was also worked out gradually, records at first being kept on skins, cloth, wooden monuments and tablets.

Copán was a chief center of the Mayan world for several centuries and was the parent city of various nearby settlements, probably founded when its population outgrew the land available for growing food. These municipalities were evidently connected with one another culturally though not politically, in much the same manner as the ancient Greek city-states.

For all its magnificence, Copán was definitely a stone-age city. Even ornamental metals were lacking. Except for two small fragments of a gold statuette – perhaps brought in from another place – which were discovered under one of the stelae, no piece of metal has been found there or, indeed, in any Old Empire site.

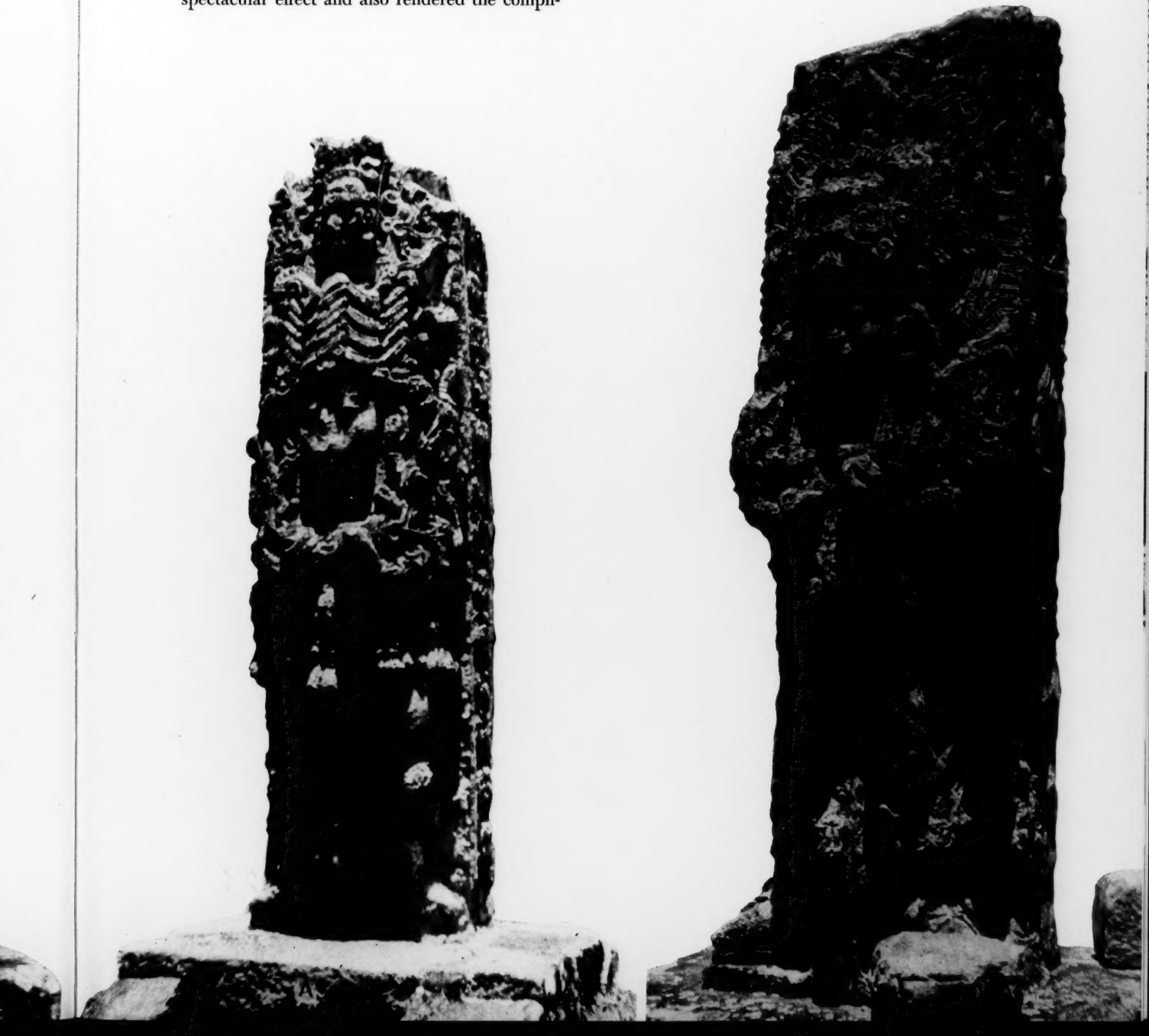
Fortunately there was in the vicinity an abundance of a soft greenish stone, seemingly of solidi-

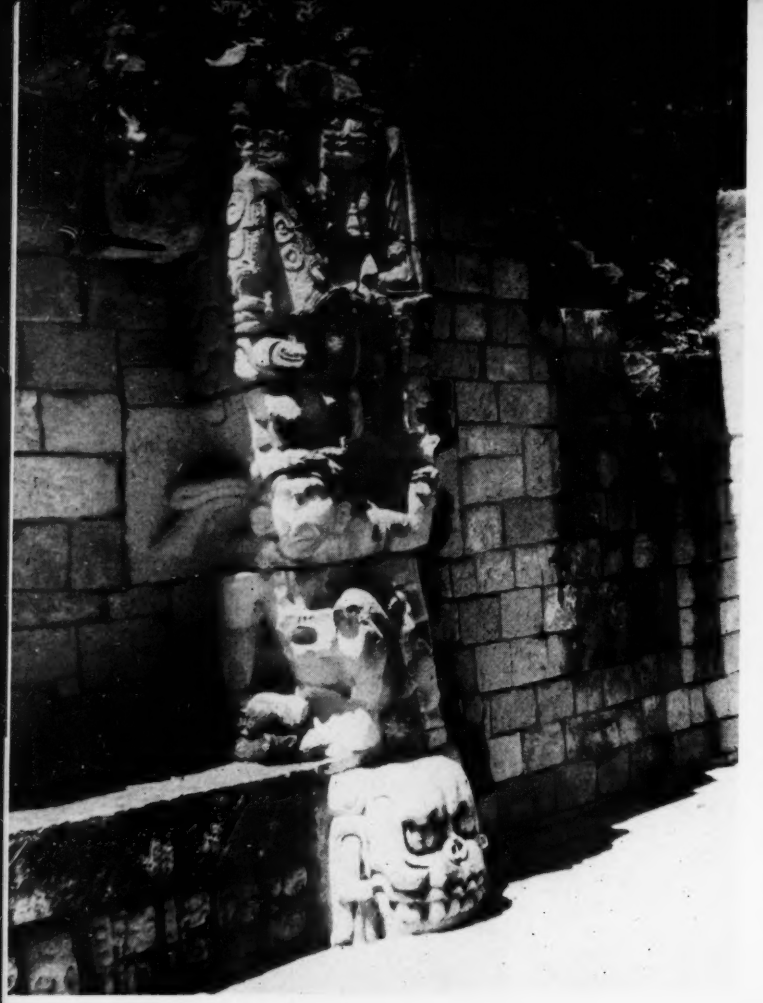
Among the great Mayan cities, Copán is especially noted for its stelae. These elaborately carved stone monuments were customarily erected to mark the passage of twenty, ten, or five year periods, frequency depending on the wealth of the city. From them we get much of what we know about Mayan ceremonial costume. *Left to right:* Stela B; back of a stela; Stela A; Stela H.

fied mud and volcanic ash, suitable for sculptural purposes. Blocks of this were cut free with chisels and hammer-stones of basalt and diorite, then – there were no draft animals – they were moved to the site of erection by sheer man-power, aided only by rollers and agave ropes. Incredible as it seems, even the intricate, elaborate decorations were carved with stone chisels, then smoothed by abrasion. This was done after the monument had been set in place, so as not to injure delicate details.

Traces of pigment show that the stelae were painted in various colors, which heightened their spectacular effect and also rendered the complicated conventionalization more intelligible by tying together related parts of the design.

Studying the orderly arrangement of the glyphs which mark the date of erection of the various monuments, one is impressed by the amazing mathematical genius of their builders, who invented a zero and place-figures centuries before the Arabs. One thinks of how remarkably venturesome they were in the realm of the imagination, for, while Europeans were still chained to the be-





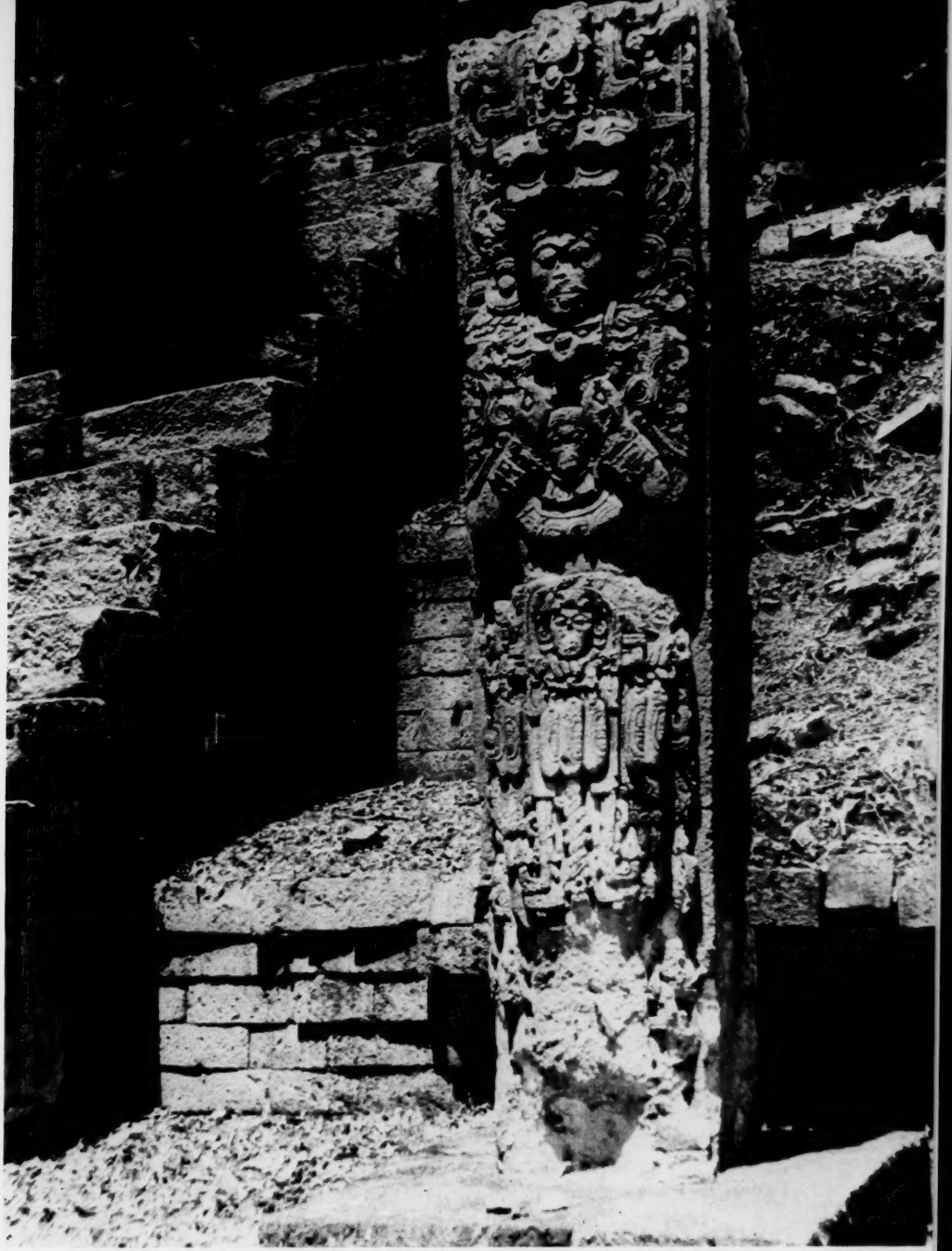
Detail of masonry and carving of Temple 22. Note the grim-looking skull at the base.

lief that the world had been created but a few thousand years before their own era, the Maya were already calculating in hundreds of milleniums. They seem, indeed, to have been fascinated by calendrical permutations, by the orderly phenomena of the recurrence of the years and the seasons, and by the mysterious procession of the days, marching endlessly through time.

Altar Q at Copán depicts a group of turbaned figures believed to represent members of an astronomical congress held in that city about A.D. 700 in connection with a revision which actually made the Mayan calendar more accurate than the one we use today. Because of this and other great astronomical attainments, the celebrated archeologist S. G. Morley has suggested that Copán be given the title of "the Alexandria of the Maya World" *(The Ancient Maya,* 1947, pp. 323 ff.).

Old-Mayan civilization was presumably peaceful, for the monuments show no weapons, no scenes of battle. Yet there evidently were sacrifices, animal and probably human, for one altar, known as the Sacrificial Stone, has a cavity in the top and spiral grooves down the sides, apparently for collecting blood and draining it away. It is located in the center of the Great Court (or Plaza), where such rites would have been plainly visible to spectators seated on the steps along the sides of that vast arena.

Not far away is the ball court, where was played



Photographs by the author

Stela P is one of the earliest of Copán's monuments. There is a marked resemblance here to the wooden totem poles of the Pacific Northwest.

a ceremonial game somewhat like a mixture of basketball, handball, and soccer, but with certain features of its own.

Most spectacular of all is the great Hieroglyphic Stairway which rises to a height of 86 feet, with an heroic-sized seated figure at every twelfth step. Between 2,000 and 2,500 pieces of stone mosaic, each block a separate hieroglyph, were set along the risers of the steps, forming the longest single inscription in Mayan characters. Unfortunately, most of these inlaid blocks were found in scrambled chaos at the foot of the stairway, possibly shaken from their places by some severe earthquake. Since nobody could decipher their mean-

The Hieroglyphic Stairway is one of the most spectacular constructions in the whole Maya area. The mosaic of hieroglyph stones covering the risers was found in scrambled chaos at the base of the steps.

A drawing by Frederick Catherwood in 1839 showing these same figures on Altar Q is so accurate as to almost precisely duplicate this excellent recent photograph. The drawing is reproduced in von Hagen's *Maya Explorer*, which tells of Copán's rediscovery.

ing, it was impossible to put them back in anything like their original order. They had to be replaced hit-or-miss.

Another distinctive feature of this group of ruins is a great cross-section cut some time during the centuries of abandonment when the nearby Río Copán changed its course. This exposed earlier plaza floors and pyramids built one over the other in onion-like layers, thus providing archeologists with a prime opportunity to study the historical development of the site. The river has now been turned back into its original bed where it will make no further inroads into the ruins.

Why people eventually deserted Copán's courtyards is not known, but the counterpart of the exodus occurred at various dates in all Old Empire cities. While it is probable that a large rural population remained on the lands between, the great city-centers collapsed and their buildings were abandoned – some even in process of construction – in the main during the century from A.D. 800 to soon after 900. Copán's last dated monument is 800; a stela near La Muñeca in southern Campeche "just possibly," J. Eric S. Thompson says, "carries a Maya date . . . equivalent to A.D. 928, the latest of all" *(The Rise and Fall of Maya Civilization,** 1954, p. 84).

Morley favored the theory that agricultural decline caused the collapse – the land losing its fertility through overproduction and the corn *milpas* gradually sodding over because without plows the Maya farmers could not break the sod. Thompson, on the other hand, believes that pressures from the encroaching Mexicans out of the northwest, combined with internal unrest on the part of the serfdom, brought about the progressive downfall of the hierarchical powers that ruled the city-states – there was no central government until that of the New Empire, later in northern Yucatán. Other theories have been proposed: volcanic cataclysm; changing climate; epidemics of some disease such as malaria or yellow fever. For the first two there is no geologic and climatologic evidence; one fact disposes of the fevers: both came from the Old World with the Spaniards.

Whatever the cause, Copán was abandoned to the forest. The site was quickly overgrown and lost, even though it was only a few miles from an

*Reviewed in this issue.–Ed.

The stylized symbolism of the Maya reached its most fantastic development in the zoömorph altars representing mythological beasts.

important trade route. Its monuments were forgotten, unseen except perhaps by an occasional hunter wandering afield, whose tales of their splendor were likely to be regarded as mere jungle dreams or the imaginings of one who has been too long away from his fellow men.

When Pedro de Alvarado, who had already conquered Guatemala, was pushing forward to subjugate San Salvador, he heard rumors of a great stone city to the east – probably Copán. But it was gold, not ruins, he sought, and he did not even bother turning aside to investigate, nor does the magnificent group of ancient structures seem to have been glimpsed by any other early explorer.

The first definite mention of them appears to be in a letter written by Diego García de Palacio to Philip II of Spain in 1576. The rumor of their existence came through literary sources finally to an American, John Lloyd Stephens, who resolved to find them. This already famous young traveler and writer got himself appointed President Van Buren's emissary to the government-in-hiding of revolution-rent Central America, and in 1839 landed at Belize with his friend, the English artist Frederick Catherwood. Copán came first – ruin hunting, much more fun than diplomacy, was Stephens' personal objective – and he stayed there some time before he finally left Mr. Catherwood to draw his magnificent renderings while he wandered around Guatemala looking for the "government."*

The meaning of the inscriptions on Copán's magnificent stone monuments mystified these two re-discoverers 115 years ago, and it is still but partially solved today – only a few of the hieroglyphs, aside from the numerical and calendrical symbols, have been interpreted. They may commemorate important events; they may be divinatory prognostications or magical formulae. Possibly they set forth the best times to plant and reap, how to appease the gods, how best to avoid the cataclysms of nature. The decipherment of Mayan hieroglyphic writing still awaits a Champollion of American archeology.

Meeantime, the once-splendid city of Copán dreams away in her green upland valley – Copán, still beautiful in her ruins, with their strange, intricate sculpture, mysterious hieroglyphics, and majestically ugly gods.

*The story of John Lloyd Stephens' discoveries, which gave American archeology its start, has been exceedingly well told by Victor Wolfgang von Hagen in *Maya Explorer: John Lloyd Stephens and the Lost Cities of Central America and Yucatán.* See Reviews, this issue.–Ed.

"E pur si muove" (but he didn't say it)

Dialogue Concerning the Two Chief World Systems — Ptolemaic & Copernican. By Galileo Galilei. Translated by Stillman Drake; Foreword by Albert Einstein. University of California Press, Berkeley and Los Angeles. 1953. xxvii + 496 pp. $10.00.

This *Dialogue*, first published in 1632, represents Galileo's thoughts and arguments on the side of the Copernican theory of the solar system. In order to present this effectively in opposition to the prevailing Ptolemaic (or geocentric) cosmology, he puts the discussion in the form of a series of conversations supposed to take place over a period of three days. The participants are Simplicio, a confirmed adherent to Aristotle and Pholemy; Sagredo, an intelligent and open-minded layman with an interest in science; and Salviati, an expert in science — who is obviously speaking for Galileo himself. The round-about form of the *Dialogue* was of course made necessary by the unfriendly view taken by Church authorities in general and the Holy Inquisition in particular on the subject of a cosmology centered at the sun instead of the earth.

The work is frankly polemical, being concerned with pushing forward the heliocentric notion in opposition to the geocentric cosmology which was generally upheld by learned men of the time. In our time, when people may hold contrary views on the interpretation of the "red-shift" or "mesons" without incurring official displeasure, we may find it difficult to realize that a violent controversy once raged as to whether the sun or the earth is the center of the universe. Now we know that neither is; but we should realize that in the 17th century most men felt a compulsion on theological grounds to put earth and man in the center of God's universe. In their pioneering ventures to put man in his (physically) insignificant place, men like Copernicus and Galileo showed their truly great stature as thinkers.

The *Dialogue* does not represent Galileo at his best as a scientist; his greatest contribution in this field was *Discourses and Demonstrations Concerning Two New Sciences* — on which the principles of mechanics were founded. Many of the arguments in the *Dialogue* will appear dull to sophisticated modern readers; as for example a long discussion to "prove" that circular motion is preferred in nature to motion on a straight line — simply because the former is "perfect and complete!" But remember that Galileo wrote the *Dialogue* for the general reader, not just for learned men. The mathematics he uses is of the most elementary kind, but rendered difficult to follow by the lack of adequate formulae and algebraic notation. On the other hand there are many wonderfully clear expositions of the scientific method and its application. To this reviewer, these glimpses into the workings of the mind of Galileo are the most wonderful parts of this magnificent book. Take, for example, this statement, given by Salviati in connection with an examination of the nature of sunspots: "If what we were discussing were a point of law or of the humanities, in which neither true nor false exists, one might trust on subtlety of mind and readiness of tongue and in the greater experience of the writers, and expect him who excelled in those things to make his reasoning most plausible, and one might judge it to be the best. But in the natural sciences, whose conclusions are true and necessary and have nothing to do with human will, one must take care not to place himself in the defense of error; for here a thousand Demostheneses and a thousand Aristotles would be left in the lurch by every mediocre wit who happened to hit upon the truth for himself. Therefore, Simplicio, give up this idea and this hope of yours that there may be men so much more learned, erudite, and well-read than the rest of us as to be able to make that which is false become true in defiance of nature" (pp. 53-54). What more forceful rejection of established authority, and an appeal for men to observe and interpret nature for themselves, could be uttered?

Following this statement, Galileo presents the essence of his beautiful demonstration that sun-spots are on the sun and not in the air between us and the heavens. It is not idle talk to refer to Galileo as the father of scientific method.

Stillman Drake has done a splendid job of putting the original into readable English; that is, into language that is vigorous and therefore fits the polemical nature of the *Dialogue*. Take the following little repartee (p. 69):

SIMP. . . ."I concur in judging the body of the moon to be very solid and hard like the earth's. Even more so, for if from Aristotle we take it that the heavens are of impenetrable hardness and the stars are the denser parts of the heavens, then it must be that they are extremely solid and most impenetrable.
SAGR. What excellent stuff, the sky, for anyone who could get hold of it for building a palace! So hard, and yet so transparent!
SALV. Rather, what terrible stuff, being completely invisible because of its extreme transparency. One could not move about the rooms without grave danger of running into the doorposts and breaking one's head."

There are helpful notes to explain the many allusions to contemporary persons and events, and an index. The reviewer hesitates to mention a small detail of the otherwise beautiful typography: It would be easier to follow the course of the conversation if the abbreviated names of the speakers had been more clearly set apart from the text, as by bold-face type or extending the line. L. E. SALANAVE

Reptiles for everyone

Amphibians and Reptiles of Western North America. By Robert C. Stebbins. Illustrated by the author. McGraw-Hill Book Company, Inc., New York. 1954. xxii + 528 pp., 104 plates, 52 text figures. $8.50.

From time to time a new book on natural history appears in the literature and sets the stage for rapid developments in its field, and there can be little doubt that this beautifully hand-illustrated volume by the leading artist in the field of cold-blooded animals will become such a landmark for western herpetology.

The book was designed primarily to provide a stimulus to novices and elementary students in the field of western coldbloods, with a rapid yet accurate means for identification of reptiles and amphibians, and to furnish a summary of these interesting animals' presently known distribution and biology. However, the volume will be found equally useful to advanced students and specialists who may desire to refresh their memory as to known occurrence of some animal or group of animals, either geographically

or altitudinally, or to find other details on biology or ecology of especial interest to them.

Some advanced taxonomist will doubtless disagree with the author's conservatism, especially in the generic treatment of some forms, or may find the segregation of species and subspecies discussions novel or inconvenient. But there will be others, particularly teachers, who will approve of this manner of attracting attention to the difference in status of these categories, and believe the arrangement to be useful in promoting recognition of the fact that the two categories cannot be handled by the same type of keys, and that subspecies are the recognizably varied or varying dynamic stage of diversification and adaptation.

Whatever criticism may be directed to some of these aspects of taxonomy and arrangement, all will recognize the solid contribution to the advancement of herpetology that this book constitutes.

This is a magnificently illustrated volume and it is replete with original information and is also up to date with contributions from literature. This volume will be essential to the libraries of all herpetologists, whether elementary or advanced, and it will be with confidence and relief that teachers will recommend its use or purchase to those flocks of junior high school and high school enthusiasts who descend into the university or college laboratories, bursting with enthusiasm and questions on herpetology.

The reviewer believes that it will be a long time indeed until some equally gifted combination, author-artist-naturalist, feels both competent and industrious enough to do a better all-around task of this magnitude.

RAYMOND B. COWLES

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University of California, Los Angeles

John of the Mountains

The Wilderness World of John Muir. With an Introduction and interpretive comments by Edwin Way Teale. Illustrated by Henry B. Kane. Houghton Mifflin Company, Boston. 1954. xx + 332 pp., 8 full-page line drawings. $4.50.

Many still live (the reviewer's father lately among them) who tramped Sierra trails with John Muir, or worked with him to found the Sierra Club. With them, the mountaineer-naturalist, ageless and sparkling as granite, is as vividly here in recollection as his name is, to their sons, on a signpost of the John Muir Trail. Though he died 40 years ago, his name is too firmly written on the land – peaks, a pass, a national monument – and institutions – schools, a college – of the West, ever to pass from memory. But in the products of his art and mind, and by his stout-hearted battles for wilderness, John Muir created his own loftiest monuments.

" 'A man in his books,' he once wrote, 'may be said to walk the earth long after he has gone.' " Edwin Way Teale quotes Muir thus in concluding his 10-page Introduction to as discerning a selection from Muir's ten, the *Life and Letters*, and the papers in *John of the Mountains*, as we are ever likely to have presented for our appreciative enjoyment. Teale came to the happy task triply qualified: by his own well-won ranking with our foremost naturalist-writers; by his authoritative knowledge of their work, coupled as it is with the genuine modesty which is a mark of his own stature; finally, by his pains in visiting on a recent nationwide tour as many as possible of the places where Muir lived or was – from Wisconsin to Florida to California – and in seeking the help of persons closely associated with Muir, such as William E. Colby, Thomas H. Kearney, Jr., Marion Randall Parsons. His "following" and "crossing John Muir's trail" give color, weight, and continuity to the interpretive and biographical leads he has put to the selections. And as we reread the well-loved and gratifyingly complete passages from *Boyhood and Youth*, *Thousand-Mile Walk*, the Sierra and national parks books, Alaska travels, *Stickeen* – that poignant and imperishable dog story – and the rest, we have again the whole, rich, triumphant life of John Muir, from the tough-graining of Scottish boyhood to the tough battles for conservation in the American West. Time to read, or reread, all of Muir is hard to find, these crowded days, but Teale has reminded us that to find it if we can would be uniquely rewarding.

John Muir's lasting value as a renewable resource of mind and heart could not be more truthfully weighed than in Edwin Teale's words: "In his writings and in his conservation achievements, Muir seems especially present in a world that is better because he lived here. His finest monument is the wild beauty he called attention to and helped preserve – beauty, however, that is never entirely safe, beauty that needs as vigilant protection today and tomorrow as it needed yesterday." D.G.K.

Silent on a peak of history

Balboa of Darién: *Discoverer of the Pacific.* By Kathleen Romoli. Doubleday & Company, Inc., New York. 1953. xv + 431 pp., endpaper and text maps. $5.00.

After seven years of publication, *Pacific Discovery* takes note of and commends to everyone intrigued by the complex web of history a complete and authoritative *relacion* of the career of Vasco Núñez de Balboa, who on 27 September, 1513, discovered the Great South Sea for the Western world.

The story as lightly outlined in our schoolbooks is well known (Keats' "stout Cortez" notwithstanding): Balboa and his band of hard-bitten conquistadores pushing across the Isthmus of Panama to a point from which the true discoverer could go on ahead and claim the first European look at the dazzling new ocean, the subsequent newsreel drama of taking possession on the beach completing the picture. Most of us know little of the context surrounding this "moment in recorded history" – Balboa's silent moment – which Mrs. Romoli believes to be matched only by that of Columbus' sighting land an ocean from Spain and that of Magellan's realizing he had rounded an unknown hemisphere. Historic moments of that caliber deserve the full treatment, by experts. Kathleen Romoli qualifies, both as expert in the sifting of historical dust and in the presentation to public view of whatever filters out.

The story of Balboa is the story of Darién. Darién was dust before it hardened on the map, to speak of its chief settlement Santa María del Antigua. But in its quarter century of life, from jungle back to jungle, this "first mainland colony in the Americas . . . constitutes a small-scale working model, handy and complete, of the whole Spanish conquest in the New World." Locus or springboard for all significant action in the life of its "protagonist" Vasco

Núñez, Darién saw played to the hilt, and out, the whole shabbily splendid, queasily courageous, stark, straggling, and mostly pitiful drama of a settlement effort foredoomed, in this case, to failure through stupidity and evildoing. Balboa came on stowed away in a barrel, exited minus his head. But because he portrayed the 16th century conquistador at his often admirable best, he can be chiefly credited during his few years of leadership with such mitigation as there was of Darién's shame. Nor was his Pacific discovery stumbled on; he had leads, he followed them intelligently in a well planned and conducted *entrada*.

Kathleen Romoli's *entrada* into the jungle of confusing and incomplete sources is a skilfully brought off piece of scholarship translated by her lively, often racy, style into a book you need not be a scholar to enjoy. D.G.K.

Two captains of discovery

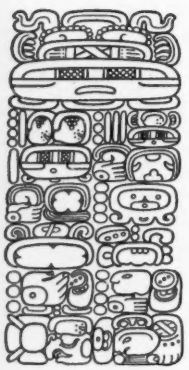
The Journals of Lewis and Clark. Edited by Bernard DeVoto. Houghton Mifflin Company, Boston. 1953. lii + 504 pp., 6 text maps by Erwin Raisz. $6.50.

The closing section of DeVoto's *The Course of Empire*, reviewed here a year ago, undoubtedly left many of us with a desire to dig into Lewis and Clark for ourselves. It is our good fortune that Mr. DeVoto himself has enabled us to do this by putting into expertly abridged form all of *The Journals* that anyone but a specialist would wish to read. At the same time, as an acknowledged authority on the inclusive period of American history, he has in a 38-page Introduction analyzed the events leading to and the consequences of the Lewis and Clark expedition. DeVoto has thus fittingly provided a conclusion to *The Course of Empire*, for, as he says, the expedition "closed the volume which opened with the first voyage of Columbus." But *The Journals* are to be read for their own sake, for their intrinsic value as the direct record of a tremendous human experience.

North through a view-finder

Northern Exposures: *Canada's Backwoods and Barrens Pictured in Monochrome and Color.* By Richard Harrington. Text and Arrangement by Clifford Wilson. Henry Schuman, Inc., New York; Thomas Nelson & Sons (Canada) Ltd., Toronto. 1953. 119 pp., 97 photos. $5.00.

There is a fascination about the northland — to speak of Canada's upper latitudes — that many feel without having been near it. The gripping account or the beautiful picture makes their blood race — those who are thus affected. The state may be prolonged and heightened most happily by a liberal infusion of Richard Harrington. Readers of *The Face of the Arctic* will have welcomed *Northern Exposures*, and any true lover of the North should have both. The author-photographer's own account of travel and living among the Eskimo is missing from the newer book, which is chiefly a magnificent portfolio of Harrington's photographs that have appeared in various issues of *Beaver*, authoritative Canadian magazine. The variety is wide: there are the woods, rocks, and canoeing waters of the Laurentians; there is the impassable white-water canyon of the Peace River far to the northwest; there are the handsome Chipewyan Indians in northern Manitoba, trading post scenes, and sled dogs; then of course there are the Eskimo, whose character Harrington again has recorded so truthfully and naturally because he knows well and respects these admirable representatives of the human race. To praise the photographer here is not by any means to slight Editor Wilson of *Beaver* who has put the thing nicely together and wrapped it up in five descriptive accounts entitled "In the Land of the Chipewyans," "By Paddle and Portage," "Dog Sled Journey," "Canadian Northwest," and "On Hudson Bay."



DISCOVERY IN BOOKS

On knowing the Maya

Maya Explorer: *John Lloyd Stephens and the Lost Cities of Central America and Yucatán.* By Victor Wolfgang von Hagen. (American Exploration and Travel Series, No. 10, third printing.) University of Oklahoma Press, Norman. 1954. xviii + 324 pp., 54 halftones, 2 insert maps. $5.00.

Popol Vuh: *The Sacred Book of the Ancient Quiché Maya.* English version by Delia Goetz and Sylvanus G. Morley from the translation of Adrián Recinos. (The Civilization of the American Indian Series, vol. 29, third printing.) University of Oklahoma Press, Norman. 1953. xix + 267 pp., map, facs. ms. pages. $3.75.

The Annals of the Cakchiquels. Translated from the Cakchiquel Maya by Adrián Recinos and Delia Goetz; and **Title of the Lords of Totonicapán.** Translated from the Quiché text into Spanish by Dionisio José Chonay. English version by Delia Goetz. (The Civilization of the American Indian Series, vol. 37.) University of Oklahoma Press, Norman. 1953. xi + 217 pp. $3.75.

The Ruins of Zaculeu Guatemala. By Richard B. Woodbury and Aubrey S. Trik, with an Introduction by John M. Dimick, and special contributions by Charles Weer Goff, William C. Root, T. Dale Stewart, and Nathalie F. S. Woodbury. In two volumes. The United Fruit Company, Boston. 1953. xviii + 466 pp., text figs., 1–168 incl. folded inset plans (vol. I), halftone figs. 169–297 (vol. II). Boxed.

The Rise and Fall of Maya Civilization. By J. Eric S. Thompson. (The Civilization of the American Indian Series, vol. 39.) University of Oklahoma Press, Norman. 1954. xii + 287 pp., 24 halftone plates, 20 text figs., map. $5.00.

Of all great discoveries of American antiquities none, we believe, has hit as hard or held as long the imaginations of people, as the finding of the "lost" Mayan cities. Since John Lloyd Stephens electrified the world 125 years ago with the news of his rediscovery of Copán, each new site that has emerged from its jungle burial in Honduras, Guatemala, or Mexico has rekindled the excitement. Nor does the count appear to be all in — ruins still turn up as more and more of the area is covered from the air. Any readable book about the Maya seems sure to find a wide audience — S. G. Morley's *The Ancient Maya* (Stanford, 1947), for one, is now in its third printing. Many of the facts of Maya culture that fascinate us, and mysteries that intrigue us, are suggested in Miss Dorothy Reynolds' article in this issue. No need to repeat them here.

The story of Stephens' discoveries would make the best beginning for someone new to Maya literature. The famous American traveler's own books — best-sellers in their

time – are collectors' items. This reviewer has not seen copies of *Incidents of Travel in Central America, Chiapas, and Yucatán* (New York, 1841) and *Incidents of Travel in Yucatán* (New York, 1843), but feels sure Victor Wolfgang von Hagen has put the life along with some of the letter of Stephens' own books into **Maya Explorer:** whatever he quotes (the quotes are frequent) flows smoothly in and out of the rest. The feeling that here you have Stephens true to his life and times is enhanced also by the liberality of von Hagen's publisher with clear reproductions of Frederick Catherwood's drawings, engravings, and lithographs, interspersed with modern photographs. (By the way, since this is also a Stephens biography, it includes an account of his visit, as the first American, to Petra – and it is interesting to compare it with Freya Stark's.)

The Maya were the only American people to develop a form of writing (though not an alphabet); therefore we can count books as well as ruins among sources of our knowledge. The **Popol Vuh** is one of only five Mayan books that survived fire at the hands of Spanish priests bent on destroying every vestige of paganism. The Maya "Bible," it tells the Creation, Quiché history and traditions, and the chronology of kings down to 1550. The manuscript in this case was not a codex in Mayan glyphs. Now lost, it was a rendering of the Quiché into Latin characters by a "highly literate Quiché Maya Indian" soon after the Conquest. A copy made by a padre is the basis of various translations.

The **Title of the Lords of Totonicapán** is Quiché history put in writing about the same time, and complements *Popol Vuh*. **The Annals of the Cakchiquels,** however, was set down, also by educated Mayas and in European writing, some 50 years later; it too relates history, down through the first century of Spanish colonization. Lengthy introductions to the present editions give the provenance of the manuscripts, their subsequent history, and the various translations. They summarize the contents, provide descriptions of the relevant Maya history and culture, and analyze the importance of these prime sources to serious students. These editions fill an important place in any library of Maya literature.

The Ruins of Zaculeu Guatemala, while not on the market, is finding its way into various libraries and collections through the generosity of the United Fruit Company, sponsors of three years' archeological work at this important northwestern Guatemalan site and of the magnificently produced book itself. It is worth consulting as an example of the complete literary and graphic recording of the results of a big project that such auspices enable. The Guatemalan government and Institute of Archaeology were also concerned with the restoration, to the end that Zaculeu, with its pyramids and temples, is preserved as a sort of national monument, for visitors to enjoy.

"We shall never know the Maya as we know sixteenth-century Spain or Elizabethan England," J. Eric S. Thompson says, "but in time, by integrating all sources of information, we should have material which will satisfy the man interested in this peak of intellectual achievement in pre-Columbian America, and which will at the same time be of value to the student of comparative history."

Morley gave us a mine of detailed information. Thompson has, in **The Rise and Fall of Maya Civilization,** performed the task of integration, analysis, and summary he calls for. The lay reader will delight in his clarity, simplicity, and philosophy veined with humor. Here is a top-rank scientist who can write! The job he set out to do – to put meaning into the accumulated scraps of evidence – must of course be done over periodically, as long as new facts come to light. May there always be someone with like qualities of mind to do it. If you can own but one Maya book, this is it. Much of the detail is here too. D.G.K.

Naturalist's compass: 365 degrees

Circle of the Seasons: *The Journal of a Naturalist's Year.* By Edwin Way Teale. Dodd, Mead & Company, New York. 1953. xii + 306 pp., 23 full-page photos. $4.00.

"What a natural wellspring – cooling and refreshing the years – is the gift of wonder! It removes the dryness from life and keeps our days fresh and expanding." Thus Edwin Way Teale, with the October 19 entry of his book for a year – any year – touches the heart of a naturalist's being. The naturalist's mind must then take the step from wondering to knowing. The marvel of nature is that knowledge usually increases wonder – that is, one proceeds from "I wonder . . .?" to "how wonderful this fact is!" How rich the naturalist is! He can put three hundred and sixty-five of his treasures between the covers of a book to make a Christmas present for you or me, not only without loss (because his treasures are countless), but with actual gain, because in shaping them to words he may add a touch of pure poetry. Then too he may reflect that his riches are renewable, and say this on the fourth day of *any* year: "The whole circle of the seasons stretches away before us as we view the year from the cold plateau of January." And Teale can say it superbly in pictures as well. D.G.K.

Discovery in art

Unesco World Art Series: Vol. I. India: *Paintings from Ajanta Caves.* Introduction by Madanjeet Singh. Published by arrangement with UNESCO. New York Graphic Society, Greenwich, Conn. 1954. 4 pp. text, 32 full-color plates, 3 halftones. $15.00.

Unesco World Art Series: Vol. II. Egypt: *Paintings from Tombs and Temples.* Introduction by Jacques Vandier. Published by arrangement with UNESCO. New York Graphic Society, Greenwich, Conn. 1954. 4 pp. text, 32 full-color plates, 3 halftones. $15.00.

A magnificent publishing venture has been launched just lately with the appearance of the first two volumes of the Unesco World Art Series. "The series is designed," the publishers say, "to bring within the reach of artists, teachers, students and the wide art-loving public, the finest quality colour reproductions of masterpieces of art which hitherto have been known to a limited few." Contemplating the graphic excellence of the color plates and the 13¼ by 18½-inch dimensions of the pages, one is amazed at the incredibly low price – until he notes that the volumes are printed and bound in Italy.

The 1,500-year-old mural paintings in the rock-cut temples of Ajanta, Hyderabad, and the Egyptian New Empire tomb paintings in the necropolis at Thebes are among the great art treasures of the world. Those of Ajanta portray the legends of Buddha's reincarnations. The Egyptian paintings show the pleasures of after-life – it was believed that depiction of the after-life as happy was insurance that

Facing page: **Maya hieroglyphic writing—an Initial Series date at Quirigua equivalent to 765 in our calendar.**
Right: **Representations of the youthful Maya maize god with maize headdresses clinging to the body of a snake, Classic Period. (From *The Rise and Fall of Maya Civilization,* courtesy University of Oklahoma Press)**

it would be. Used as we are to ancient sculpture, we find something of a revelation in the warmth, the humanity of the paintings; the mellow glow of their colors; their qualities of technique and design. Art aside, they show the universality of human hopes and aspirations. Painting, like music, is a language that knows boundaries neither of place nor of time. An owner of these splendid volumes can count himself rich in some of the priceless treasures of human creation. Other volumes are in press.

Double discovery

The Freya Stark Story. A condensation in one volume of *Traveller's Prelude, Beyond Euphrates,* and *The Coast of Incense,* by Freya Stark. Coward-McCann, Inc., New York. 1953. x + 374 pp., 22 halftones, map. $6.75.

Two kinds of discovery often await us in books of travel: that of places, naturally, and that of personalities. *The Freya Stark Story* (honestly titled!) leans so much to the latter as to be quite frankly more autobiography than travel book, especially Part One: *Traveller's Prelude.* In the other two parts travel and personality are indivisible, but by this time you know Miss Stark well enough to accept her gladly as a congenial and informed guide to the ever fascinating lands and peoples of the Near and Middle East in the turbulent interval between the two world wars. There is a glimpse of Iran, sojourn in Iraq. Sharper focus draws our interest to opposite ends of the Red Sea: to ancient Petra, fabulous city of tombs carved in sheer rock walls; and to the Hadhramaut, where Arabia opposes the Indian Ocean with a wall of rock and time to which a backwash of humanity clings in stubborn resistance to change. For many, however, the chief discovery of this book will have been Freya Stark herself, – English gentlewoman, courageous and much honored traveler, Near East expert to her government in war, incomparable writer, – and her full length books of travel here represented in one inviting volume.

Ark with three decks

The Animal Kingdom: *The strange and wonderful ways of mammals, birds, reptiles, fishes and insects. A new and authentic natural history of the wildlife of the world.* By George G. Goodwin, Charles M. Bogert, Dean Amadon, E. Thomas Gilliard, Christopher W. Coates, James W. Atz, John C. Pallister. Frederick Drimmer, Editor-in-Chief. In three volumes. Greystone Press, New York. 1954. xl + 2062 pp., 550 illus. in line and halftone, 20 full-color pages. Boxed, $17.50.

Here in handsome gold-stamped maroon buckram is a gift par excellence for a nature-minded family, or for a class to present to a school library. The authors of this animal encyclopedia may all be found in research departments of the American Museum of Natural History, except aquarium curators Coates and Atz of the New York Zoological Society. Such weight of authority suggests that faults, if any, are in the omission class; it has been noted, for instance, that treatment of insects is somewhat sketchy. Well – insects are the most numerous class of animals. Omitted from the subtitle, but not from the work, are amphibians and aquatic invertebrates. Photos and color plates are grand; line drawings are from many sources – most of them are very good. Text, nontechnical, is meant to be read. All in all, this is a commendable performance.

Away from home, on the range

The Four Winds Cookbook. By Cyril von Baumann and Beulah Phelps Harris. Thomas Y. Crowell Company, New York. 1954. xxvii + 292 pp. $3.95.

A cookbook in these pages? Man, this is *discovery!* An archeologist sniffed the cooking pots of peoples around the world. A culinary expert translated his notes into recipes adjusted to the American kitchen and supermarket. The result? Try it. Editor and wife have been reviewing this one on the kitchen stove for the past few months, testing it on ourselves and guests. It is only by frisking departing guests that we still possess the book. The "Cookeries" included are Latin American, Pacific Islands (Pacific discovery of the mouth water), Near Eastern, European, and African. You don't like eggplant? Try *hunkiav beyandi* (Egypt) or *batinjen bil furn* (also from the Nile). It is useless to cite examples. Everything we've tried so far has panned out for a gustatorial revelation. D.G.K.

Previews

Some books to be reviewed in forthcoming issues, which meanwhile we can recommend heartily – for giving or keeping: **The Giant Cactus Forest and its World,** Paul Griswold Howes (Little, Brown, $7.50); **Mammals of California and its Coastal Waters,** Lloyd Glenn Ingles (Stanford, $6.00); **Beyond the Hundredth Meridian,** *John Wesley Powell and the Second Opening of the West,* Wallace Stegner (Houghton Mifflin, $6.00); **From an Antique Land,** *Ancient and Modern in the Middle East,* Julian Huxley (Crown, $6.00); **New Green World,** *John Bartram and the Early Naturalists,* Josephine Herbst (Hastings, $4.00); **Great River,** *the Rio Grande in North American History,* Paul Horgan (Rinehart, 2 vols., boxed, $10.00); **Glory, God and Gold,** *a narrative history of the Southwest,* Paul I. Wellman (Doubleday, $6.00); **The Age of Mountaineering,** James Ramsey Ullman (Lippincott, $6.00); **Art of Asia,** Helen Rubissow (Philosophical Library, $6.00); **Journey to the Far Amazon,** Alain Gheerbrant (Simon & Schuster, $5.00); **American Seashells,** R. Tucker Abbott (Van Nostrand, $12.50); **Mushrooms & Toadstools:** *a study of the activities of fungi,* John Ramsbottom (Collins, $6.75).

"Beneath the Blue Ceiling"

Books mentioned in Editorial, pages 1-2:

The Silent World. By Captain J. Y. Cousteau with Frédéric Dumas. Harper & Brothers, New York. 1953. xiv + 266 pp., 64 pp. photos, incl. 16 in full color. $4.00.

To Hidden Depths. By Captain Philippe Tailliez. E. P. Dutton & Company, Inc., New York. 1954. 188 pp., 28 halftone photos, 12 full-color pages, 7 maps and diagrams. $5.00.

Lady With a Spear. By Eugenie Clark. Harper & Brothers, New York. 1953. xii + 243 pp., 36 photographs, line decorations by the author. $3.50.

Manta: *Under the Red Sea with spear and camera.* By Hans Hass. Translated from the German by James Cleugh. Rand McNally & Company, Chicago. 1953. 278 pp., 84 photographs. $4.50.

The Undersea Adventure. By Philippe Diolé. Translated from the French by Alan Ross. Julian Messner, Inc., New York. 1953. xi + 236 pp., 28 photographs. $4.50.

4,000 Years Under the Sea. By Philippe Diolé. Translated by Gerard Hopkins. Julian Messner, Inc., New York. 1954. xiv + 237 pp., 19 photographs, maps. $4.50.

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Errata

November-December 1953 — page 21: FOR initials B.J. READ B.D. Apologies to Benjamin Draper, who has kindly refrained from mentioning this one.

July-August 1954—page 2: Author McKenzie has objected to our parenthetical addition of the statement that New Zealand's climate has been called "Mediterranean" by some, and wishes to disclaim authorship of it. The statement was gleaned from an authoritative source and added by the editor, as a term familiar to Californians, in order to liken New Zealand climate to that of our own Pacific Coast. Apparently the terminology, if not the climate, is controversial!

Map (inside back cover): FOR L. Wakitipu READ L. Wakatipu.

September-October 1954—page 7 (caption): C. M. Kirkpatrick, associate professor of wildlife management, Purdue University, kindly sent us this one: "The picture of the nest is that of a coot, not a pied-billed grebe. The evidence is 12 finely dotted eggs in a good depression of a dry nest composed of cattail leaves and stems. None of this would hold for the pied-billed grebe."

Page 9 (caption): FOR "class" of the jellyfishes and sea anemones READ "phylum."

Page 11 (caption): Rotifers belong to the phylum Rotatoria, not Protozoa. Editor takes full blame for the last two boners.

Page 29 (review of *Wildlife in Alaska*): the reference to A. Starker Leopold could be taken to mean that he is *the director* of the Sierra Club—he *is* a member of the board of directors.

Page 32: department heading FROM THE READER inadvertently omitted.

For young readers, all ages

THE FIELD of so-called juveniles (many of which are very attractive to adults) is so rich that *PD* does not attempt to cover it. The few recommended here are no more than a sampling: ★ **The Wonderful World:** *the adventure of the earth we live on,* James Fisher (Hanover House, $2.50) — large format, full color on every page, excellent relief maps, diagrams, many big panoramas: comparable physically to *Life's* "World We Live In" series; three parts: How the World Began; The Face of the World; Man's World; breathtaking in its scope and color; one of the year's most exciting books, for all ages. ★ By the Fentons, Carroll Lane & Mildred Adams: **Riches from the Earth:** *the story of our mineral resources* (John Day, $2.75); ★ **Our Changing Weather** (Doubleday, $2.50) with photos as well as drawings. ★ By Carroll Lane Fenton: **Prehistoric World:** *stories of animal life in past ages* (John Day, $2.75) — the Fenton books are recognized as authoritative and are distinguished by Mr. Fenton's prismatic drawings. ★ **Why We Live Where We Live,** Eva Knox Evans (Little, Brown, $3.00) — history of America's geography, how our cities, towns, roads, canals, farms came to be where they are; many lively illustrations, outline map. ★ **Life on the Earth,** Rose Wyler & Gerald Ames (Schuman, $2.50) — biology's principles made clear through nicely chosen example, writing that would improve many an adult book, simple drawings. ★ **Insects and the Homes They Build,** Dorothy Sterling, photos by Myron Ehrenberg (Doubleday, $2.50) — explains caterpillar tents, wasp paper, bee cells, froghopper bubbles, termite galleries, and all such examples of the constructive genius of insects, as well as the way of life that goes with each; photos on nearly every page ★ **Insect Fact and Folklore,** Lucy W. Clausen, Ph.D. (Macmillan, $3.50) — high school age up; included here because it cannot fail to thrill an omnivorous teen-ager alert for the "story behind the story" — history of silkworm culture, mosquito vs. man at the Panama Canal, Egyptian scarab lore — and intrigue the parent as well. There is a chapter for each major order, so it is easy to run down the facts behind a given insect superstition or proverb. ★ **Animals in Armor,** Clarence J. Hylander (Macmillan, $3.50) — for the 12–16 year old who *has* to keep snakes and lizards (might also make a squeamish mom more tolerant!); one of the Young Naturalist Series, this has all familiar American reptiles and their ways, by the author of *Sea and Shore* and *Trees and Trails;* many good photos. ★ **How to Make a Home Nature Museum,** Vinson Brown (Little, Brown, $2.50) — detailed directions for collecting, mounting, casting, arranging specimens, making dioramas, by the author of the popular *Amateur Naturalist's Handbook* (and also illustrated by *PD's* editor, if we may be excused for mentioning it). ★ **White Mountaineer,** Rutherford G. Montgomery (Little, Brown, $2.75) — "true-life" story of a Rocky Mountain goat, à la Sally Carrighar or Frank Stuart but for self-reading at 12 up or reading-to from about 8 on. ★ **Kon-Tiki and I,** Erik Hesselberg (Rand McNally, $2.50) — with the most delightful humor, the artist of the *Kon-Tiki* Expedition has given us his own version of the thrilling voyage by raft from Peru to Polynesia, in pen drawings and hand-lettered text. Every *Kon-Tiki* fan should have it, in case it was missed before — there is nothing like it between covers. There is nothing like Hesselberg, either, a mountain of humor "six feet four inches above sea level"! He is said to have outdone all the other members of *Kon-Tiki's* crew in sheer enjoyment of the experience. His gay book puts a fresh face on the epic voyage, and heightens our enjoyment of it, too.

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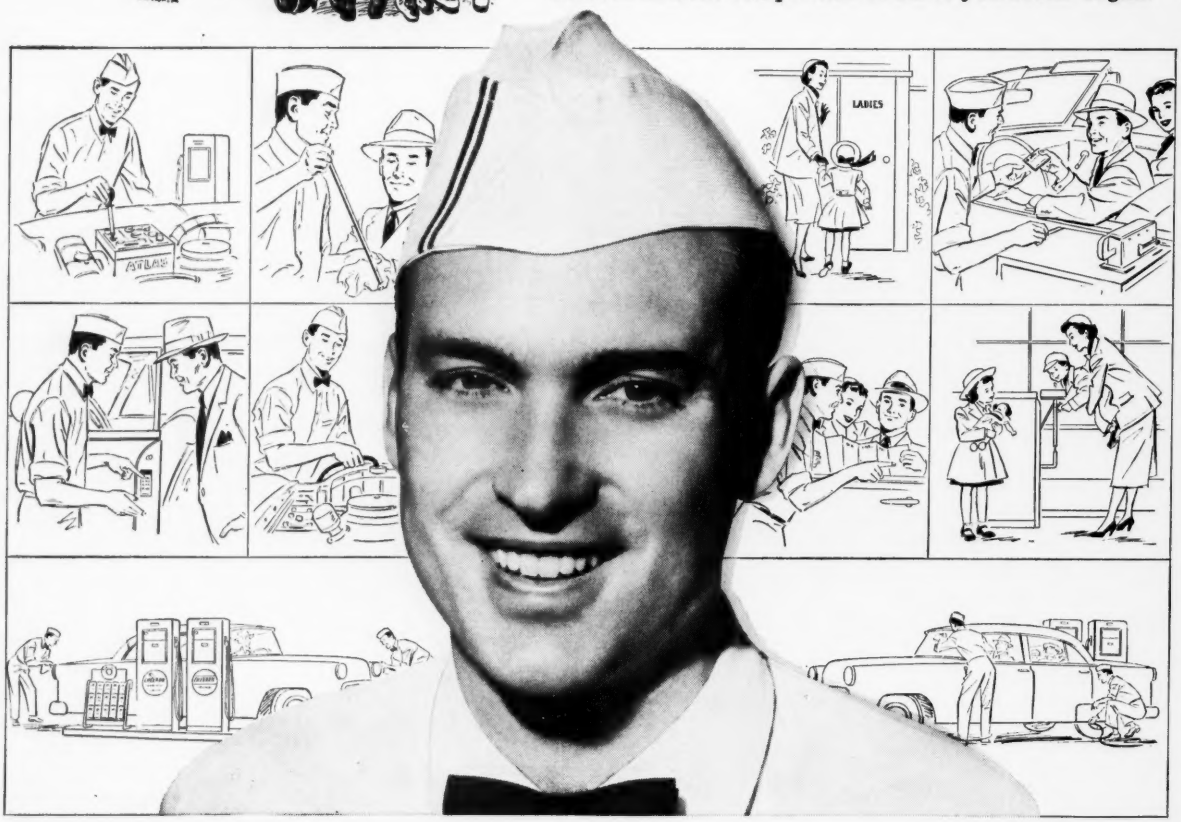

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